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ON THE ETIOLOGY OF DIPHTHERIA.

An Experimental Study.

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Part I.

The thoughtful student of diphtheria is early impressed, alike in his studies by the bedside, at the dissecting-table, and in the laboratory, by the indefinite conception which so widely prevails as to the nature and limitations of the disease. The difficulties with which this lack of precision invests the subject are especially felt when he is trying to get light upon its etiology. The standpoint from which these studies are undertaken can, perhaps, be best made clear by a brief statement of the views which the writer believes to be generally held in this country as to the general nature of diphtheria and its relations to diseases not infrequently confounded with it.

Diphtheria, in its more pronounced forms, is an acute infectious disease, presenting in most cases a more or less characteristic local lesion in some of the external or internal surfaces of the body. This local lesion is most frequent in the pharynx and upper air-passages, but may occur on any mucous membrane, or on the skin, or on the surfaces of wounds.

This local inflammation may find expression in a variety of ways. There may be a simple redness of the affected surfaces, which passes away leaving no trace. There may be a more or less intense catarrhal inflammation with much or little exudation, and nothing else. There may be a limited or extended superficial or deep necrosis of the mucous mem-

brane, a form of necrosis called coagulation-necrosis, in which the nuclei of the cells disappear, and the cell bodies are converted into a more or less homogeneous or granular mass somewhat resembling fibrin, so that the affected surfaces appear to be covered with a whitish or grayish pellicle or membrane. There may be, in connection with or without this necrotic pellicle, a fibrinous exudate intermingled with leucocytes, fragments of epithelial cells, red-blood cells, and granular matter.

The pellicle, or false membrane, pseudo-membrane as it is called, may be loosely attached to the affected surfaces, or so firmly adherent as to seem to form a part of the underlying tissues. Associated with all these forms of the local lesion of diphtheria are varying, but usually large, numbers of dead and living microörganisms. Disintegration and softening or exfoliation of the false membrane, with or without loss of substance of the underlying tissue, ulceration, phlegmon, œdema, and abscess, represent occasional progressive phases or complications of the lesion. The adjacent lymph-glands are apt to be swollen and congested.

It is not necessary to describe here in more detail the minute structure of the false membrane in diphtheria, nor the various minor modifications which it presents. Nor is it necessary to do more than call attention to the fact that, although the occurrence of a false membrane is very frequent in the disease and of great diagnostic importance, there are cases of genuine diphtheria in which no false membrane is formed.

It is, however, highly important to remember that, so far as its anatomical characters are concerned, a false membrane very similar to that above described is by no means limited in its occurrence to diphtheria. A pseudo-membrane may be induced experimentally in animals, as it would seem, by any agency which will deprive mucous membranes, such as that of the trachea, of their epithelial covering, and fulfil the conditions of fibrin-generation through the induction of emigration of leucocytes. It may be formed under the influence of a great variety of local irritants, such as steam, cantharides, corrosive sublimate, arsenic, sulphuric acid, ammonia, etc. It may also be formed as Huebner (1) has shown, by such a local temporary mechanical interference with the circulation in the affected part as will impair the integrity of its vascular endothelium.

Under all of these conditions, then, a false membrane may be formed essentially similar in anatomical character, so far as we yet know, save, perhaps, for the microörganisms which it contains, to some of the forms which are frequent in diphtheria. This false membrane is often called a croupous membrane, and the form of inflammation which it accompanies a croupous inflammation. It is also, unfortunately, termed a diphtheritic membrane alike whether it occurs in diphtheria or in inflammation due to a variety of other local causes.

The attempt to establish an anatomical distinction between those forms,

especially of pharyngeal and laryngeal inflammation with the formation of a false membrane, which, on the one hand, seemed to be of a purely local character, and, on the other, were associated with evidences of systemic infection; the attempt, in other words, to establish a morphological criterion for the differentiation of what is known as croup or simple pseudo-membranous inflammation of the larynx and of the pharynx from a more serious form of disease called diphtheria, was a legitimate attempt to meet an urgent demand for precision in the interests both of treatment and prophylaxis. Especially under Virchow's teaching, it was at one time generally believed that, if the pseudo-membrane had evidently encroached upon the structure of the underlying parts, so that its removal involved a loss of substance, its formation was due to those agencies which induced the disease known as diphtheria. If, on the other hand, the pellicle was superficial, it was the result of a simple local croupous inflammation, and might be due to a variety of causes. When, however, it became evident, as it soon did, that in very many cases in which a more or less extensive pharyngeal or laryngeal inflammation with a pseudo-membrane, was associated with grave systemic reaction, the false membrane was apparently entirely superficial, and could be stripped off without injury to the underlying tissue; when, on the other hand, a similar local inflammation developed with no evidences whatsoever of systemic infection, and with no tendency to the spread of the disease from one individual to another, and still it was found that there might be a close adherence, even a genuine infiltration of the underlying tissue with the false membrane: it became evident that the deep or superficial character of the lesion was a distinction between simple pseudo-membranous pharyngitis or laryngitis and diphtheria which, in fact, did not distinguish.

In the reaction which followed the loss of faith in this anatomical distinction between simple croupous and diphtheritic inflammation, the often repeated observation that cases running the ordinary course of a simple local croupous inflammation with no systemic reaction, might apparently serve as a starting-point of widespread epidemics of genuine diphtheria, led many to take the ground that every inflammation with the formation of a pseudo-membrane which was not evidently traumatic —*i. e.*, due either to chemical or mechanical injury—should be regarded as diphtheria. In other words, the view seems generally to have become prevalent that it is at least safe and wise to consider those forms of disease commonly known as simple croup or pseudo-membranous laryngitis and pseudo-membranous pharyngitis as all local lesions of diphtheria, but diphtheria in which the symptoms of general infection are sometimes well defined and sometimes very little marked or absent altogether.

Whether the material which induces the inflammation in diphtheria sometimes reaches the point of local expression through the blood-

vessels, or always from the surface in the affected region, it is not possible now absolutely to say, but both clinical and experimental evidences speak strongly in favor of the latter view.

The observations, largely clinical, but in part anatomical, which have led to the general belief that diphtheria is an acute infectious disease are too well known to need recapitulation here. If it be an acute infectious disease, the great advances in our knowledge of other diseases of this class would justify us in the conjecture that it is caused by bacteria and by some one or more particular species. Should such species, proved to stand in an etiological relationship to the disease, be ultimately discovered in the local lesions, most of the difficulties of definition which now beset our path would be largely removed. In other words, it is the etiological factor in diphtheria which we need to know in order to make those exact distinctions between it and other diseases with a similar local lesion, which the exigencies both of prophylaxis and treatment demand. When we know what causes diphtheria, then, and not till then, shall we know what diphtheria really is and how to define it. In the meantime we have to search for the etiological factor in the disease, without a more precise characterization of it than is furnished by the clinical observations in each particular case.

A large number of the older observers, in the use of the comparatively crude methods formerly in vogue, found bacteria of various forms in the membrane, and most of these seemed to belong to the group of micrococci, although bacilli are noted. But we have long since learned that the morphological examination does not suffice for the determination of a bacterial species. We must cultivate them in pure form to learn the much more definite biological features which characterize them. Not less indefinite were the results of the early attempts to reproduce the disease in animals. For the most part, the inoculation of animals, either subcutaneously or on the mucous membrane or directly into the blood, was practised with fragments of the false membrane, or with cultures from these, which, owing to the lack of proper methods, were never pure cultures of a single species, but a mixture of various forms. Under these conditions, sometimes in the animal a false membrane, or what passed for such, was produced; sometimes fatal septicæmia or local inflammatory lesions; sometimes all of these together, and sometimes none of them. But we should not forget that neither a false membrane nor septicæmia nor a simple local inflammation, nor even the simultaneous occurrence of these necessarily constitutes diphtheria.

We now know that there are many forms of bacteria which, when introduced into the bodies of animals, produce serious disturbance, marked disease, and even death. We know that some of the bacteria which are frequently present in the healthy human body, or its excretions, may, when introduced into the tissues or blood of animals, induce

disease and death. So that now-a-days, when animals are inoculated with such unknown mixtures of various kinds of germs as may be in a diphtheritic membrane and die, our interpretation of the results is much more guarded and our conclusions much less sweeping than was formerly the case.

For our present purpose, then, we may pass without detailed review the long list of patient researches on the etiology of diphtheria which preceded the formulation of the new methods of bacterial study by Koch; not because they are without value or importance, but because the vantage-ground of the modern observer is on a so much higher plane of exactness and precision.[1] It implies no lack of respect for the conscientious workers of an older period of science, that at the advent of a new and revolutionizing mode of research the earlier results should for the moment be set aside until in the light of new and rapidly accumulating facts their significance can be justly estimated.

Historical Summary.

The first exact study of the etiology of diphtheria by the use of the modern culture methods was by Loeffler, in 1883 (2). At this time, after a careful *résumé* of the work which had gone before, this observer came to the conclusion that no reliable data were at hand for fixing upon any particular species of bacteria as the cause of diphtheria; nor had any of the variously modified inoculations of animals, either with the crude membrane of diphtheria or the impure cultures from it, ever induced what could fairly be regarded as real diphtheria.

It will suffice for our purpose to give an outline of Loeffler's results. Two species of bacteria were found by him, sometimes alone, sometimes together, in so many cases as to render them of apparent significance. These were: 1, a chain coccus or streptococcus; and, 2, a slender bacillus.

So far as the chain coccus is concerned, although he apparently found it present by the morphological examination, in a considerable number of cases—as well in the blood and viscera as in the false membrane—he isolated and identified it by cultures in only five cases; from the tonsils in three of them; from the heart, liver, and spleen in two; from the kidney in one. Not only the biological characters of the chain coccus, but its general effects upon inoculated animals would seem to indicate its close relationship, if not its identity, with the streptococcus pyogenes and streptococcus erysipelatos. Its local effects upon inoculated mucous membrane did not at all resemble the characteristic common local lesions of diphtheria. Loeffler is disposed to consider this species, in most cases

[1] For a *résumé* of older researches on the etiology of diphtheria see Loeffler's studies, Bibliography, No. 2.

at least, as of secondary importance—though perhaps inducing complications; but his reasons for this view do not seem to be very precise or convincing.

The bacilli of Loeffler are about as long on the average as the bacillus tuberculosis, and about twice as thick. They are frequently a little thickened or knobbed at the end. They stain readily with alkaline methylene-blue solutions. They are immobile, and do not grow at the ordinary temperature of the room. On blood-serum or on a mixture of blood-serum with beef-tea, peptone, grape-sugar, and salt, they grow readily at 37° C. (98.6° F.). They grow, also, as has since been shown, on nutrient agar, to which ten per cent. of glycerine has been added. These bacilli were obtained in pure culture from the false membranes in six cases of diphtheria. In one of these cases the streptococcus was also found. In four of them the material examined was the membrane simply, taken from children during life. By a simple morphological examination of seven other cases he found bacilli which appeared to be similar to those which he had cultivated. In the cases, however, which were examined both morphologically and by cultures, the bacilli do not seem to have been more frequently present than were the streptococci.

Cultures of the bacilli injected subcutaneously into guinea-pigs killed the animals within two to three days, producing a whitish or hemorrhagic exudate at the seat of inoculation and widespread œdema of the adjacent subcutaneous tissue. The internal organs were free from the inoculated bacilli, which were present only at the seat of inoculation. Introduced into the mucous membranes of rabbits, guinea-pigs, chickens, or pigeons, a fibrinous pellicle was frequently formed over the inoculated surface. Sometimes there were considerable general œdema and pleural exudation. On the other hand, the bacilli were not found in all typical cases of human diphtheria. They were absent in more than one-half of those examined morphologically, and in four out of ten in which cultures were made. The bacilli were not present in the fibrinous pellicles induced on animal mucous membrane either in numbers or situations corresponding to the human local lesion. They were often absent altogether. They did not seem to produce their effects on uninjured mucous membranes. They were found once in the mouth of a healthy child.

Thus while the researches of Loeffler led the way along lines which may be regarded in many respects as models for future workers, no positive conclusion was reached as to the cause of diphtheria. He concludes that while his bacilli are possibly the cause of diphtheria, the strict proof was not furnished by his investigations.

Loeffler is disposed to believe that there may be more than one kind of diphtheria; that the form of the disease in which the streptococci are present is characterized by a marked necrosis of the affected surface, while the pseudo-membrane is not prominently or extensively developed;

and, further, that the cocci enter the lymph channels and may find their way into various distant parts of the body, even blocking the smaller bloodvessels. That form of diphtheria, on the other hand, in which he finds the bacilli is characterized by an abundant pseudo-membrane which may contain the bacilli in that part which borders on the original epithelial surface.

This view, that diphtheria might be caused by different species of microörganisms, had been already urged by Klebs (3), who had observed that the bacteria common in the false membrane in the cases which he had studied in Prague were of an entirely different form from those which he found in his later observations at Zurich. While in the former cases they were micrococci (microsporon diphtheriticum), in the latter they were bacilli apparently identical, morphologically, with those which the studies of Loeffler led him to regard as of much significance. The bacilli are now commonly known as the Klebs-Loeffler diphtheria bacilli.

In 1884, Emmerich (4) announced himself at the International Congress of Hygiene at the Hague as the discoverer of the real germ of diphtheria. He considers the disease in man and the pigeon as identical. His bacillus is short and stout, about twice as long as broad, is apt to occur in pairs. It grows luxuriantly in ordinary nutrient gelatine at 15° C. (59° F.), not fluidifying. On potato it grows vigorously, resembling the pneumococcus of Friedländer. He claims as the result of inoculations of pigeons, rabbits, and white mice, that he produces a disease which is usually fatal; that a pseudo-membrane forms in the trachea; and that the bacteria are found in the blood and in the internal organs, especially in the kidneys. Important as these results of Emmerich may seem to be, they have not been confirmed by others, and in several particulars there appear to be such possibilities of serious error in his technical procedures that it would seem unwise to attach a definite value to them until fuller detail or control research by others has given us more positive data. At a later period Emmerich (5), while still insisting upon the importance of his alleged diphtheria bacillus, calls attention to the frequent occurrence of streptococci in the diphtheritic membranes.

In 1886, Babes (6) reports the cultivation from six cases of pharyngeal diphtheria, from eight cases of croupous laryngitis, from three cases of diphtheria after measles, from one case of diphtheria after scarlatina, and from one case of diphtheria of the conjunctiva, of the bacillus of Loeffler among others. In these cases he found streptococci associated with Loeffler's bacillus. The details of his work are not given in this report nor is there any intimation that he tested the pathogenic properties of the isolated bacilli. In view of the incomplete character of this work and of the later discovery (see below) by Loeffler and v. Hoffmann, of a somewhat similar non-virulent bacillus, these results of Babes cannot be

given much weight as evidence of the frequency of the occurrence or importance of Loeffler's bacillus in diphtheria.

In April, 1887, Loeffler (7) again made a communication upon the subject, in which he states that in ten cases in which fresh diphtheritic membranes were examined he found the bacilli in all. He also describes the occurrence in one of his cases of a bacillus very similar in its morphological and biological characters to those found in his earlier studies, but which was without effect upon animals. This he calls the "pseudo-diphtheritic bacillus."

Penzoldt (8), in 1887, as the result of a long series of somewhat rambling experiments found that he could not succeed in inducing typical diphtheria in rabbits, chickens, or pigeons by inoculation either with fresh diphtheritic membranes or with cultures from them. He sometimes obtained thick or thin, for the most part loose, pellicles over the inoculated surfaces, but these could be induced by a variety of bacteria which obviously have nothing to do with diphtheria. He gives but little detail as to the species which he isolated by culture. He emerges from his researches with a disposition to believe that diphtheria, in a clinical sense, may be due to a variety of causes.

Fränkel, in the same year, described a case, in an adult, of diphtheria of the fauces and larynx with secondary phlegmonous inflammation and pleurisy and pericarditis, from which he cultivated the streptococcus pyogenes (9). He describes another case, also an adult, of diphtheria of the pharynx and larynx with secondary ulcerative endocarditis From the pseudo-membranes as well as from the heart lesion he cultivated the streptococcus pyogenes.

D'Espine (10) has reported the isolation of a bacillus similar to that described by Loeffler, but the meagreness of his published data prevents a definite judgment as to the importance of his observations.

Early in 1888 v. Hoffmann (11) described the very frequent occurrence —in twenty-six out of forty-five cases—on the mucous membrane of the larynx, as well in diphtheria, scarlatina, measles, and simple catarrh as in quite normal conditions, of a bacillus apparently identical with the pseudo-diphtheritic bacillus of Loeffler. That is, it was very similar in morphology and growth to the diphtheria bacillus of Loeffler, but not virulent. A careful comparison of the genuine with the pseudo-diphtheritic bacillus led v. Hoffmann to the recognition of biological and morphological distinctions by which the two forms could be recognized. With this knowledge he again set to work, and from eight new cases of diphtheria he isolated the genuine Loeffler bacilli. But these, in one case, were not at all virulent for guinea-pigs, and in the others in a much less degree than those originally isolated by Loeffler. V. Hoffmann further isolated from three cases of measles the bacillus of Loeffler, the cultures in one case being virulent to guinea-pigs, in two not. Six times

in nineteen cases of scarlatina he found Loeffler's bacilli, and these in no case were virulent. From the pharynx or larynx in eleven healthy cases he isolated Loeffler's bacillus four times; one of the cultures was virulent, the other not. V. Hoffmann seems to have made no animal experiments with the view of proving the etiological relation to diphtheria of these, Loeffler's bacilli, which he isolated. He simply tested their capacity of killing guinea-pigs by subcutaneous inoculations.

Recently, Roux and Yersin (17) have examined, partly by culture methods and partly morphologically, fifteen (?) cases of diphtheria, and state that they found the Klebs Loeffler bacilli in all. The record of their observations is so incomplete, however, that it does not appear whether or not they made cultures from all the cases. They apparently did not make use of the plate-culture method, but sowed the material from the pseudo-membranes directly upon tubes. Animal experiments were made, but were, so far as appears, comparatively few in number and apparently with cultures from but a few of the cases. These, in general, are said to be confirmatory of Loeffler's results. But as the local results of inoculations on injured mucous membranes are said by the authors, without detailed description, simply to be "false membranes," it is difficult to judge of their nature. The most suggestive part of their observations is the induction of symptoms of paralysis in animals by the injection of the fluids in which the bacilli had grown, and which had been freed from the germs by filtration. What bacteria, if any, other than those which they fixed upon as similar to the species isolated by Loeffler, developed in their cultures, does not appear, nor are such details of technique given as would inspire the reader with confidence that the cultures with which the animals were inoculated were actually pure cultures.

On the whole, the observations and experiments of these writers appear to be confirmatory of the work of Loeffler. But the records are so incomplete, and their technical procedures are of such a questionable nature and are so meagrely described, that it is very difficult to conclude whether the work is really of importance or not.

Since the perfection of the methods of staining bacteria in the tissues, a number of more or less careful simple morphological studies of diphtheritic lesions have been made, with the general result of showing what indeed had been demonstrated, even with the crude facilities of the older technique—that the diphtheritic membrane contains, as a rule, large numbers of bacteria of various shapes—the micrococcus form generally preponderating. This method also shows that the bacteria are sometimes present in the living tissue immediately about the seat of the false membrane, when this is formed, and that they sometimes are and sometimes are not to be found in the blood and internal organs.

If now we make a close summary of the actual results of the recent experimental work on diphtheria along the new lines of research, reject-

ing all simple morphological studies as incomplete and inconclusive, and confining ourselves to those cases only in which the culture methods have definitely revealed the identity of the bacteria, we find that from 16 cases of diphtheria out of 20 Loeffler isolated a bacillus which was capable of killing certain of the lower animals when introduced subcutaneously, and which, as tested from 6 cases when inoculated into a wounded mucous membrane, might induce an inflammation with a fibrinous pellicle. V. Hoffmann isolated the bacilli of Loeffler from 8 cases of diphtheria, but he cultivated them from 13 out of 33 cases of healthy and diseased air-passages in which there was no diphtheria present. Thus, while the Klebs-Loeffler bacilli have been cultivated 24 times from 28 cases thus examined, they have been found in 14 out of 34 cases which had nothing to do with diphtheria.

The results of animal inoculations with the pure cultures of Loeffler's bacillus are, on the whole, rather less convincing than the simple morphological and biological results. Certain animals are apt to die as the result of the inoculation of the Klebs-Loeffler bacillus, and inoculation on an injured mucous membrane may be followed by the formation of a fibrinous pellicle which somewhat, but not very closely, resembles the pseudo-membrane common in diphtheria. But if we recall how many agencies there are capable of producing a pseudo-membrane on the mucous surfaces, and how many forms of bacteria kill animals on subcutaneous injection with symptoms and lesions very similar indeed to those induced by Loeffler's bacillus, it seems to the writer that the reasons for identifying the animal with the human disease are neither definite nor convincing.

At present, then, it would seem that actual existing knowledge justifies us only in the conjecture that diphtheria is caused by some form or forms of bacteria. What the species is, or whether there are more than one, we do not know. We are confronted to-day with the same series of questions about which discussion has centred for many years. Are the diseases called pseudo-membranous pharyngitis and pseudo-membranous laryngitis or simple croup really, after all, identical with genuine diphtheria, differing only in that in one case there is a simple local lesion, while in the other there is a general systemic infection? It does not help us much in studying the etiology to assume that the systemic infection which stamps diphtheria as an acute infectious disease, and gives it clinically a more or less definitely isolated position, is the crucial test, because it is not only quite possible, but highly probable, that here, as for example in a poisoned wound of the finger, the process may in one set of cases be and remain local, while in another it may be local for a time and then become general, or be general almost from the outset.

That there is a form of croupous inflammation of the pharynx,

larynx, and other air-passages, not due to active chemical irritants, and not occurring, as we say, "spontaneously," which is not obviously infectious and not apparently communicable from one individual to another, would seem to be well established by clinical observations. On the other hand, there is every reason to believe that many cases presenting the clinical features of simple croupous inflammation may be really diphtheria—as judged from the standpoint of their etiology—but in which, from some ineffective condition of the germs, from the smallness of the numbers inoculated, or from the resisting capacity of the individual, the action of the poison is limited to the seat of inoculation. We are constrained still to query whether the diphtheritic inflammation of the pharynx and other air-passages which so frequently accompanies scarlet fever and measles belongs to a different group from that which is not thus associated.

Character and Scope of Observations, Technique, etc.

The writer does not set before himself, in this paper, so ambitious a purpose as the complete solution of this problem of the etiology of diphtheria, which is one of the most complex and difficult, as it is one of the most important, questions in experimental pathology. But he wishes simply to record a series of observations made, in the light of modern science and with improved technical facilities, on a number of cases of diphtheria occurring in and near New York. When from one and another observer a sufficient number of such sets of cases shall have been studied and recorded, it is probable that then, and not until then, shall we be able to state definitely what the disease really is, the etiology of which we are seeking to discover. The problem is, at best, one of extraordinary difficulty, because we are liable to have on the exposed parts most often the seat of the local lesion of diphtheria the greatest variety of living bacteria, from the air, from water, and from food. These must all be carefully studied one by one, in each particular case, with all the precautions against error which experience and patience can furnish to the investigator.

The cases thus fully studied were those in which the clinical history left no room for doubt as to the diagnosis; all the fatal cases of extensive pseudo-membranous laryngitis, as well as pharyngitis, being regarded as diphtheria. They were most of them in children, were fatal, and early autopsies were made in nearly every case. The autopsies in most of the cases were made by a most competent and experienced observer—Dr. William P. Northrup—to whose zeal and courtesy I am indebted for much of the material. The parts to be subjected to examination in most of the cases were placed in carefully cleansed jars immediately on removal from the body, and brought or sent at once to the laboratory, where the detailed biological examination was begun without delay

and carried on with the use of all the precautions against accidental contamination which the technical procedures formulated by Koch so admirably cover.

It has seemed to the writer wise, in undertaking these studies, not to seek to gather material for observation from a great variety of sources and from persons whose illnesses had run their course under the greatest variety of conditions, but to limit it largely to children, and especially to children which are placed under the general sanitary conditions prevalent in children's hospitals and asylums, where the cases may be closely observed from the outset and the surrounding conditions studied and more or less controlled.

Thus, while most of the cases came from one large foundling asylum,[1] in which the sanitary conditions are rather above the average in such institutions, in order to have some measure of comparison other cases were taken from other similar public institutions in other parts of New York City, and two cases occurred in private practice in one family in an adjacent town.

It will be readily appreciated, by those familiar with the details of such researches as these, that such a limitation of the problem is rendered imperative by the large expenditure of time which is required for the working out in full of any single case. Thus it was that a considerable amount of material from a number of cases of diphtheria (membranes, etc.), which was kindly placed by his colleague at the writer's disposal, was not made use of at all, partly because of the lack of time and partly because it was believed that a small group of cases fully worked out might lead to more reliable and tangible results than many only partially studied. In order, however, to avoid a misunderstanding of this selection of cases, it should be stated that material from every case of diphtheria which belonged in the group above indicated, and which came in proper condition for study into the writer's hands, was worked carefully through, and the results of all are recorded below.[2]

The primary task which the writer set before himself in the examination of these cases of diphtheria was, first, to ascertain, by the modern culture methods, what living microörganisms, if any, were present at and about the seat of the lesion or in the internal organs with sufficient frequency to justify the assumption that they might stand in an etiological relationship to the disease; to separate these in pure cultures, and study their life-history. Second, to learn by morphological examination of sections of the hardened and stained tissues what were the situation,

[1] These studies have extended over a period of two years, so that the cases from the large foundling asylum represent two distinct epidemics in successive years.

[2] I wish especially to acknowledge my indebtedness for material to Drs. J. Lewis Smith, R. Van Santvoord, L. Putzel, C. W. Oakes, and Mr. Charles Laylbach.

distribution, and, so far as might be estimated, numbers of the micro-organisms which might be present. Third, to ascertain the effects upon animals of the inoculation of the isolated species.

It seems hardly necessary to say that in all cases plate cultures were first made, and that these were manipulated in the usual way for the separation of individual species. Gelatine, agar, agar-glycerine, and blood-serum plates were used—the agar and agar-glycerine being the most generally efficient. Save for the gelatine cultures, the temperature of 37° C. (98.6° F.) was uniformly employed for the growth. The plate-cultures were mostly made either in shallow, covered dishes or in Esmarch tubes—generally in the former. Duplicate plates were in all cases made for the purpose of control, not only in the different cases, but for each part or organ subjected to examination. With this large number of plates, it was possible to make the sowings so dilute that the very large number of bacteria usually present in material from the air-passages could be readily obtained in isolated colonies.

It seemed unnecessary for the purpose in view, except in the first cases, to do more than isolate the similar species which developed in the different cases. Thus, a large number of forms which were familiar to the writer as occurring in the air, or water, or food, or those which control-cultures from the mouths and throats of healthy children, or those not suffering from diphtheria, showed to be common and unimportant, could be ignored after such observations on their characters as sufficed for their identification. Single colonies of different species developing on the plates were also for the most part ignored in the examination, since the probabilities were greatly against such isolated forms being of any significance. The task was thus narrowed down to the investigation of those forms of bacteria which developed in considerable numbers on the plates, and especially those similar forms which were found to occur on the plates made from different cases.

The colonies of these forms which were to be studied in detail were transferred first to a second set of plates and these, if evidently pure, were inoculated into tubes. In some cases, where large numbers of forms were present, several successive transfers from plate to plate were necessary to insure purity. The examination of the plates was made in the culture-room of the laboratory, which is kept scrupulously clean by the frequent washing of its shelves and floor with disinfecting solutions, and the air-supply to which, driven in by the ventilating fans, is filtered through frequently changed layers of dry cotton. In this way the air of the culture-room is so thoroughly free from germs that aërial contamination of the exposed plates during their examination was very infrequent. Thus it was possible to follow the development of colonies on the plates, even though they might be slowly growing forms, for long periods without danger of overgrowth by adventitious contaminations.

The writer had, fortunately, been able to acquire practical familiarity with the morphological and biological characters of Loeffler's bacillus from cultures which were the direct descendants of those isolated by Loeffler himself, and brought directly from Berlin.

Large numbers of duplicate sections from the hardened tissues of all the cases were prepared, and studied with a Zeiss $\frac{1}{12}$ homogeneous immersion lens and the Abbé condenser. Some of these sections were stained with Loeffler's alkaline methylene-blue solution, some by Gram's method, and some with the simple aqueous fuchsin solution. By the use of these three methods of staining in each case, the possibility of overlooking any form of bacteria in the tissues examined was largely reduced.

Having thus indicated the scope of the work and the precautions against error, it does not seem necessary to give an account of each case in detail, but to present the results in the form of a *résumé*.

The cases of diphtheria studied were twenty-four in number.[1]

Cases of Diphtheria Examined.

Case I.—*Clinical history:* Male, seven months. Feb. 8th, pertussis; 10th, diphtheria; 12th, intubation; 14th, death. *Autopsy*, twelve hours: Moderately thick and softening membrane in the trachea extending into the larger bronchi; tracheal wall at the lower end of tube eroded; broncho-pneumonia. *Bacterial examination—Morphological:* Enormous numbers of cocci, single, clustered, and in longer and shorter chains in all parts of the false membrane, particularly in its deeper layers; a few scattering, large, plump bacilli in the membrane. *Cultures: Streptococci*[2] in enormous numbers. Staphylococcus pyogenes aureus. A few scattering forms, the most abundant of which was a large bacillus resembling bacillus subtilis. In the false membrane in the trachea, the streptococcus exceeded the staphylococcus in numbers in about the proportion of 1300 to one, while in the bronchial exudate the proportion was about ten to one.

Case II.—*Clinical history:* Male, two years and seven months. Jan. 28th, pertussis; 29th, acute tonsillitis, temperature 105°; 30th, diphtheria, albuminuria. Feb. 2d, broncho-pneumonia; 15th, death. *Autopsy*, three hours: Dense membrane in the lower part of trachea and in the larger and smaller bronchi; broncho-pneumonia in both lower lobes; parenchymatous nephritis. *Bacterial examination—Morphological:* In the bronchial exudate, especially in its deeper layers, were large numbers of cocci scattered in clumps and in longer and shorter chains. Similar cocci were found between the necrotic epithelial cells of the mucous

[1] The writer has made a large number of simple morphological examinations of sections of the false membranes and underlying parts from other cases of diphtheria than those now to be recorded; and, while it may be said of these that the cocci are, in almost every case, the prevailing form of bacteria, yet, as the morphological examination does not suffice to identify the species, the observations serve as contributing evidence of such moderate value, in the present state of our knowledge, that it does not seem worth while to do more than merely mention them here.

[2] For the sake of convenience, the morphological and biological character of this streptococcus will be given in detail below.

membrane. A few chains of cocci were present in the lymph spaces of the mucosa and submucosa. A few stout bacilli were scattered through the false membrane. *Cultures: Streptococci* in large numbers. Staphylococcus pyogenes aureus. Aside from a few scattering colonies of variously shaped bacteria there were considerable numbers of a common white fluidifying yeast.

CASE III.—*Clinical history:* Umbilical phlegmon developed seven days after birth. At the same time pseudo-membrane was noticed on the pharynx, and there was considerable purulent conjunctivitis. With an increase in the amount of pseudo-membrane, and more intense phlegmonous inflammation about the umbilicus, the child died fourteen days after birth.[1] *Autopsy:* Dense firm pseudo-membrane over both tonsils and epiglottis; voluminous softening membrane in trachea and larger bronchi; broncho-pneumonia in both lower lobes with pulmonary congestion; parenchymatous degeneration of kidney; extensive umbilical phlegmon with suppuration. *Bacterial examination—Morphological:* Throughout the entire extent of the false membrane great numbers of cocci scattered and in chains. These were present as well in the deeper as in the superficial portions of the membrane. A small number were found scattered in the lymph spaces of the submucosa. A few scattering large bacilli were found in the membrane. *Cultures: Streptococci* in enormous numbers. Staphylococci pyogenes aureus and albus. A considerable number of large, long and plump, and short plump, round-ended bacilli. Cultures from the phlegmon showed both the streptococci and staphylococci.

CASE IV.—*Clinical history:* Female, three years and eight months. April 28th, varicella; 29th, croupy; 30th, dyspnœa and cyanosis, temperature 104.8°. May 2d, broncho-pneumonia, temperature 105.5°; 4th, death. *Autopsy,* twelve hours: Abundant pseudo membrane in pharynx, larynx, trachea, and larger bronchi, firm and closely adherent above, and softening in the trachea; broncho-pneumonia in both lower lobes; parenchymatous degeneration in kidneys. *Bacterial examination—Morphological:* Moderate numbers of cocci scattered and in longer and shorter chains in the false membrane. *Cultures: Streptococci* in enormous numbers and in nearly pure culture. A few staphylococci pyogenes aureus and a few other scattering forms on some of the plates.

CASE V.—*Clinical history:* Female, two years and eight months. May 5th, had been two weeks convalescent from scarlet fever when a pseudo-membrane developed on the soft palate. Temperature 101°; albumin 80 per cent., granular casts. Two days later died, apparently from heart failure. *Autopsy,* six hours: Very slightly developed membrane, best formed in the trachea; moderate pulmonary congestion. *Bacterial examination—Morphological:* In the tracheal exudate a small number of cocci and a few stumpy bacilli. *Cultures: Streptococcus* colonies developed in small numbers on the plates, with a few colonies of staphylococcus pyogenes aureus and a few scattering forms.

CASE VI.—*Clinical history:* Female, three years. May 10th, pharynx red; 11th, scarlatina; 15th, pseudo-membrane in pharynx; 17th, diarrhœa; 20th, croupy cough, temperature 103°; 23d, weaker, dyspnœa; 25th, intubation, death. *Autopsy,* three hours: Firm pseudo-membrane

[1] This case was, in part, reported by Dr. J. Lewis Smith to the New York Pathological Society, June 13, 1888.

over both ulcerated tonsils. Pseudo-membrane in upper portions of trachea. Commencing broncho-pneumonia. Kidneys congested; parenchymatous degeneration. *Bacterial examination—Morphological:* The pseudo-membrane over the surface of the tonsils and the necrotic tissue on the tonsils near the ulcers and in the false membrane were crammed with cocci, single, massed, and in long and short chains. (See Plate I. and Plate II., Fig. 3.) The lymph nodules or follicles of the tonsils contained numerous single and chain cocci scattered between the cells. No bacteria were found by morphological examination in the kidney. *Cultures: Streptococci* were present in enormous numbers in the cultures from the pseudo-membrane of the tonsils and the necrotic tissue beneath it. They were also very abundant in the membrane from the upper portion of the trachea, less abundant in the softening portions below. Streptococci in pure culture and in considerable numbers from the kidney. Staphylococcus pyogenes aureus, most abundant in pharyngeal membrane.

Case VII.—*Clinical history:* Male, two and a half years. May 24th, vomiting and croupy cough; 25th, pseudo-membrane in pharynx; 26th, temperature 102½°, croupy cough increasing, dyspnœa, death. *Autopsy*, thirty hours: Dense voluminous pseudo-membrane over both slightly roughened and ulcerated tonsils, over the entire larynx, and extending down to the larger bronchi; membrane softened below; commencing broncho-pneumonia. *Bacterial examination—Morphological:* In the pseudo-membrane over the tonsils, in the crypts of the tonsils, and in the necrotic tissue at the edges of the tonsillar ulcers were large numbers of cocci scattered and in short chains. A few stout bacilli in the superficial portions of the membrane. *Cultures: Streptococcus* colonies in enormous numbers in cultures from all parts of the membrane. Staphylococci pyogenes aureus and considerable number of scattering forms. Kidney cultures showed considerable number of streptococcus colonies, and nothing else.

Case VIII.—*Clinical history:* Female, one year. Three days before death follicular stomatitis; during next night restlessness; then collapse and death. *Autopsy*, two and a half hours: Tonsils ulcerated and covered with firm pseudo-membrane; dense, firmly adherent membrane on the posterior pharynx, upper part of trachea, and œsophagus; enterocolitis; parenchymatous degeneration of kidney; commencing broncho-pneumonia. *Bacterial examination—Morphological:* Everywhere in the membrane and in the necrotic tissue near the ulcers of the tonsils were great numbers of cocci, scattered, clustered, and in large and short chains. These streptococci were less abundant in the tracheal membrane than above. Few scattering forms of bacilli. *Cultures: Streptococcus* colonies developed in vast numbers from the pseudo-membrane. Kidney cultures were negative, while from the spleen pure cultures of streptococci grew. Staphylococci pyogenes albus in small numbers grew from the membranes, while there were large numbers of the common "chain bacillus" of the mouth and a few scattering forms.

Case IX.—*Clinical history:* Female, two years. May 27th, pneumonia, left side; temperature 106°. Seemed to recover. June 4th, pseudo-membrane on left tonsil. 5th, croupy cough, dyspnœa; intubation; broncho-pneumonia developed. 6th, death. *Autopsy*, twenty-one hours: Softening membrane over both tonsils; broncho-pneumonia, with pleurisy in left lower lobe. *Bacterial examination—Morphological:* In the

PLATE I.

Portion of tonsil in diphtheria (Case VI.) showing infiltration of the tissues with streptococci, with necrotic tissue in the vicinity of the bacteria. A small portion of the invaded tissue, more highly magnified, is shown in Plate II., Fig. 3.

PLATE II.

FIG. 1.—Streptococcus diphtheriæ; beef-tea culture:—showing the tendency of the bacteria to group themselves in pairs as well as in chains.

FIG. 2.—Edge of streptococcus colony growing on the surface of an agar-plate:—showing the loops and chains which grow out from the central denser portion of the colony.

FIG. 3.—A small portion, more highly magnified, of the tissue of the tonsil shown in Plate I., invaded by the streptococcus.

membrane on tonsil considerable numbers of scattering cocci and streptococci; nothing else. *Cultures: Streptococcus* colonies grew in considerable numbers from the membrane; also large numbers of staphylococci pyogenes aureus, considerable numbers of fluorescent bacilli (doubtless from water) and of the "chain bacillus."

CASE X.—*Clinical history:* Male, three years. May 7th, scarlatina; 11th, pseudo-membrane on tonsils; 14th, otitis; 16th, swelling under left jaw. June 1st, abscess opened behind tonsil; 7th, death. *Autopsy*, four hours: Pseudo-membrane dense and firmly adherent at the base of tongue and over both tonsils, which were ulcerated. The membrane extended over the epiglottis, completely investing the larynx to below the vocal cords, where it became softened and shreddy. Chronic and commencing fresh broncho-pneumonia. Bronchial lymph glands greatly swollen and red. Kidneys, parenchymatous degeneration. *Bacterial examination—Morphological:* Everywhere in the pseudo-membrane and in the necrotic mucosa beneath were vast numbers of cocci, singly, clustered, and in long and short chains. A few isolated clusters of moderately stout, long bacilli were found near the surface of the pseudo-membrane. The lymph sinuses of the bronchial glands were distended, and contained an abundant network of fibrin. No bacteria were found in the spleen, kidney, liver, or bronchial lymph glands. *Cultures: Streptococci* in great numbers developed from various parts of the pseudo-membrane. The spleen cultures were negative, but a few colonies of streptococci, and nothing else, grew from the kidney and liver. Staphylococci pyogenes aureus grew in considerable numbers from the membrane, and a few from the liver. Some scattering forms of colonies developed from the membrane, the most abundant of which were the "chain bacillus" and a fluorescent water bacillus.

CASE XI.—*Clinical history:* Female, three years and two months. Feb. 1st, rectal abscess; 5th, croupy cough; 6th, intubation; 7th, death. *Autopsy*, sixteen hours: Pseudo-membrane in larynx, trachea, and larger bronchi. *Bacterial examination—Morphological:* Moderate numbers of cocci, mostly in pairs, in the pseudo-membrane. *Cultures: Streptococcus* colonies grew from the membrane in nearly pure culture. Staphylococci pyogenes aureus developed in small numbers, and a few scattering forms.

CASE XII.—*Clinical history:* Female, two and a half years. Feb. 9th, croupy cough, pseudo-membrane; 11th, intubation, broncho-pneumonia; 14th, temperature 102½°; 16th, death. *Autopsy*, two hours: Pseudo-membrane in pharynx, larynx, and trachea; ulcer in trachea at end of tube; broncho-pneumonia in both lower lobes. *Bacterial examination—Morphological:* Large numbers of cocci, many in chains, in the pseudo-membrane; few scattered bacilli. *Cultures: Streptococcus* colonies in considerable numbers grew from the membrane. Also staphylococcus pyogenes aureus and a few scattering colonies of stout, large bacilli.

CASE XIII.—*Clinical history:* Female, two years and two months. Brought to the hospital with vulvitis, which developed into erysipelas about vulva. Eight days later, false membrane appeared on the tongue; then croup followed, with death in five days. *Autopsy*, two hours: Vulva denuded of epithelium, dusky red. Dense, firm, closely adherent membrane on velum and uvula; tonsils ulcerated and covered with false membrane, which extended down over the posterior surface of

the epiglottis and onward to just below the vocal cords; no broncho-pneumonia. *Bacterial examination—Morphological:* Large numbers of cocci, single, in pairs and chains, in the deeper layers of pseudo-membrane, and extending deeply into the underlying tissue, accompanied here, when in large numbers, by necrosis. Other scattering forms were abundant. Scattered clusters of slender bacilli were found in the pseudo-membrane near the vocal cords, especially in the most superficial portions. *Cultures:* In the pseudo-membrane from the tonsils, pharynx, and larynx, enormous numbers of *streptococci* in nearly pure cultures; a few staphylococci pyogenes aureus and a few scattering forms, mostly large bacilli.

Case XIV.—*Clinical history:* Female, two months. Returned to hospital from out-nursing with bad cough, and after being for eight days in room with considerable number of children, sick and well, developed diphtheria, rapidly followed by broncho-pneumonia, with death in two days. *Autopsy,* eleven hours: Pseudo-membrane over both tonsils; on posterior pharynx and in larynx and trachea down to bifurcation membrane softening. *Bacterial examination—Morphological:* The pseudo-membrane had in many places considerably involved the superficial portions of the mucosa. Moderate numbers of cocci and streptococci in the pseudo-membrane, together with a considerable number of stout, long bacilli in the more superficial portions. *Cultures:* False membrane on tonsils, pharynx, and larynx all alike showed large numbers of *streptococci.* There were also many staphylococci pyogenes aureus and a considerable number of colonies of coarse, stumpy bacilli.

Case XV.—*Clinical history:* Male, three years. Returned to hospital Dec. 3d. On Dec. 13th developed diphtheria; 20th, intubation; 23d, broncho-pneumonia, cyanosis, death. *Autopsy,* six hours: Tonsils swollen, not ulcerated. Small patch of pseudo-membrane on pharynx, and extending from the tip of the epiglottis to the medium bronchi, firm and closely adherent above. Congestion and commencing broncho-pneumonia in both posterior lower lobes. Cortex of kidney thick and opaque, spleen and liver appear normal. *Bacterial examination—Morphological:* Surfaces of tonsils and crypts intact, with small masses of diplococci and streptococci here and there in the crypts. In the pseudo-membrane enormous numbers of cocci in pairs and chains, especially in the deeper layers and in the necrotic tissue of the submucosa beneath. Other scattering forms were present, but none abundant. No bacteria found in the viscera. *Cultures:* Large numbers of *streptococcus* colonies developed from scrapings of tonsil crypts, from various parts of the pseudo-membrane, and from the lungs. Cultures of liver, kidney, and spleen were negative.

Case XVI.—*Clinical history:* Male, three and a half years. Six months in hospital. Dec. 20th, croupy cough, relieved by emetic. 21st, croup symptoms continued; no pseudo-membrane seen on pharynx. 22d, died. *Autopsy,* four hours: Tonsils swollen with large pit-like crypts. Dense, firm pseudo-membrane extends from tip of epiglottis down to bifurcation of trachea; firmly attached as far down as vocal cords, below this loose. Bronchitis, but no broncho-pneumonia. Bronchial and tracheal lymph glands swollen and red. Kidneys, parenchymatous degeneration. Ulcerative gastritis and ileo-colitis. *Bacterial examination—Morphological:* In the pseudo-membrane very few scat-

tered bacteria were found. There were a few cocci, mostly on the surface, and a few short, stout bacilli. There was no necrosis of the tonsils, and but few bacteria in the crypts. No bacteria of any form were found in either bronchial or lymph glands, or in the kidney, liver, or spleen. *Cultures:* In the pseudo-membrane and tonsil crypts were found a considerable number of short, stout, round-end bacilli and several scattering forms. No streptococcus colonies developed. Cultures from the lymph glands and viscera were sterile.

CASE XVII.—*Clinical history* is wanting, save that the child, with several others in the same hospital, was suffering from measles when the diphtheria developed. No pseudo-membrane was seen in the pharynx, and the child died soon after the diphtheritic symptoms manifested themselves. *Autopsy:* Tonsils much swollen, with somewhat ragged surfaces. Voluminous, firm pseudo-membrane from the tip of epiglottis down to medium bronchi, loosened and softening below. Commencing broncho-pneumonia. Cortex of kidney slightly thickened, liver and spleen appeared normal. *Bacterial examination—Morphological:* Large numbers of cocci, streptococci, and diplococci in tonsil crypts and over the eroded surfaces. Similar forms in moderate numbers in the deeper layers of the pseudo-membrane. Aside from these, only scattering forms. No bacteria found in kidney, liver, or spleen. *Cultures:* Large numbers of *streptococci* from all parts of the pseudo-membrane and from the tonsil crypts, also some scattering forms. A few streptococcus colonies developed from the kidney and spleen; liver cultures were negative.

CASE XVIII.—*Clinical history:* Child, one year. Had been in hospital for six months with bronchitis. Measles developed on Dec. 24th, and ran a course of ordinary severity; croupy symptoms began early in the disease, and on Jan. 8th diphtheritic symptoms were pronounced, though there was no pseudo-membrane on the pharynx. The child died on Jan. 9th. *Autopsy:* No pseudo-membrane on pharynx, but on the larynx below the epiglottis were numerous, small, irregular, firm, closely adherent patches of pseudo-membrane; the tracheal and bronchial glands were red and swollen. Viscera not examined. *Bacterial examination—Morphological:* Large numbers of cocci, single, paired, and in chains, were irregularly grouped, especially in the deeper layers of the pseudo-membrane and sparsely infiltrated the mucosa beneath. No bacteria were found in the tracheal and bronchial glands. *Cultures:* Small numbers of various scattering forms, among which a few staphylococci pyogenes aureus were present. The *streptococcus* was present in large numbers.

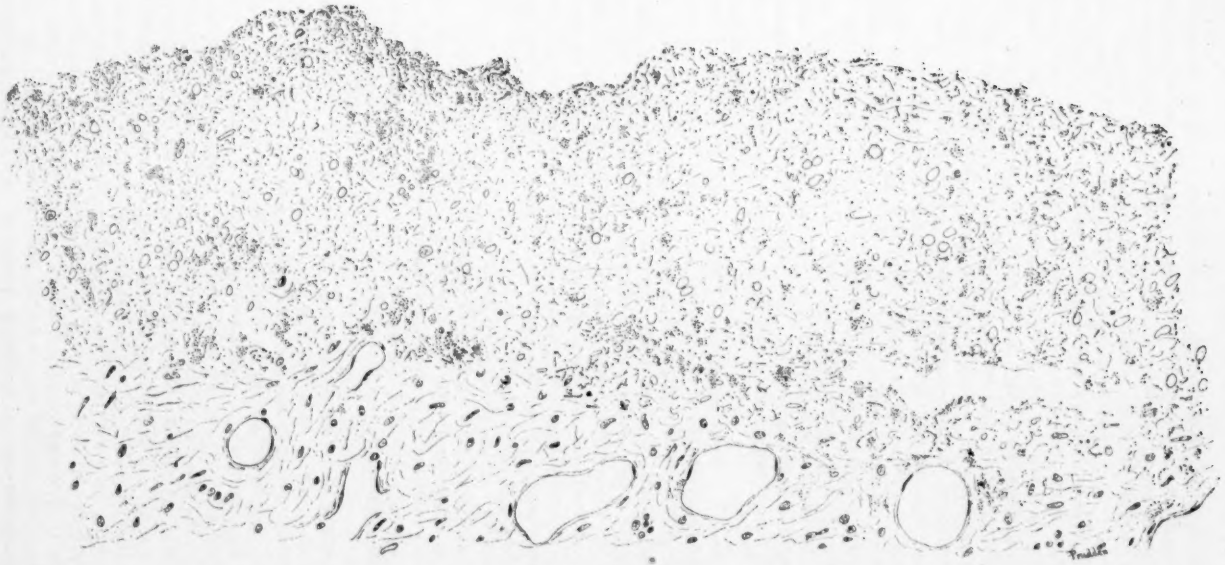
CASE XIX.—*Clinical history:* Child, one year and eight months. Four months in hospital with diarrhœa. The child was attacked with measles of a severe form, with high temperature, vomiting, and cough. Croupy symptoms appeared on the third day, and increased steadily till the sixth, when tracheotomy was performed. Slight improvement followed, but the child died thirty-six hours after the operation. *Autopsy:* Small particles of pseudo-membrane on tonsils. Dense voluminous membrane in larynx and trachea. Cheesy bronchial glands, with localized tubercular inflammation of the lungs, and fresh broncho-pneumonia. *Bacterial examination—Morphological:* Pseudo-membrane closely adherent in places with much involvement of the epithelium, and superficial necrosis of the submucosa. Enormous numbers of cocci, single, in pairs and chains, in the deeper layers of the pseudo-membrane, in the necrotic

mucosa, and infiltrating in smaller numbers the lymph spaces of the submucosa (see Plate III.). No bacteria found in the lymph glands. *Cultures:* From the pseudo-membrane of the larynx and trachea were cultivated large numbers of *streptococci*. Besides these a few colonies of staphylococci pyogenes aureus and albus, and a few scattering forms.

CASE XX.—*Clinical history:* Child, two years. Twenty-three days in hospital with diarrhœa. Measles developed, running a severe course with high temperature. A croupy cough developed early with dyspnœa and symptoms of pneumonia. On the eighth day intubation was practised without benefit, and the child died in a few hours. *Autopsy:* Tonsils were swollen; the mouth of the crypts dilated. No false membrane was found, but both laryngeal and pharyngeal mucous membranes were swollen and intensely red. The bronchial glands were red and swollen. The lungs were congested. *Bacterial examination—Morphological:* The epithelium covering the surfaces of the tonsils and lining the crypts was for the most part intact, but here and there in the depth of the crypts small patches of necrotic epithelium were found, which were infiltrated with streptococci. A few scattering cocci and streptococci were found on the surface of the intact epithelium in the crypts. In the ventricles of the larynx and about the rima glottidis were considerable numbers of cocci and streptococci, with a few stout bacilli. The epithelium in the ventricles of the larynx was in places partially detached and necrotic, and in these regions numerous streptococci were found beneath the epithelium, and in the superficial layers of the submucosa. In this case, then, in which there was no pseudo-membrane, in two places, at least, there appeared to be a commencing invasion of the tissues with streptococci. No bacteria were found in the lymph glands. The air-spaces of the lungs contained enormous numbers of streptococci and cocci. *Cultures:* Scrapings from the tonsil crypts and from the region of the vocal cords showed considerable numbers of *streptococci*, together with scattering forms.

CASE XXI.—*Clinical history:* Child, one year and six months. In hospital six months. Measles running a severe course, with temperature 104°. Dyspnœa was developed early, and the child died twenty-four hours after the commencement of the disease. *Autopsy:* Tonsils were swollen and ragged. In the pharynx, at the base of the epiglottis, on either side, was a small, irregular patch of pseudo-membrane, dense and closely adherent. Small white-surfaced ulcers were found just below the rima glottidis. No pseudo-membrane visible elsewhere, but the larynx was of a dusky red color. *Bacterial examination—Morphological:* The bloodvessels of the mucous membrane were widely dilated. In the small patches of pseudo-membrane in the pharynx, as well as at the seat of the ulcer, below the rima glottidis, there were large collections of cocci, mostly in short chains, which penetrated the submucosa, and on either side extended beneath the intact epithelium. In the vicinity of these regions, but especially in the pharynx, there were considerable collections of cocci and streptococci lying closely packed against the surface, or infiltrating the superficial epithelial layers. In the regions where these bacteria were numerous the epithelium was either necrotic or was much thickened and peeling off in large masses. The tonsils were intact, but in the mouths of the crypts, as well as entangled in the mucus of the larynx, were a few cocci, single or in short chains, and a few scattering forms of other bacteria. In this case we seem to have the com-

PLATE III.



Section of diphtheritic pseudo-membrane with submucosa, from the trachea in Case XIX. The pseudo-membrane is composed in part of inflammatory exudate, in part of necrotic mucous membrane, and both this and the submucosa are infiltrated with the streptococci.

mencement of the formation of the pseudo-membrane, and the invasion of the adjacent tissues with streptococci. *Cultures:* A moderate number of *streptococci* grew from the scrapings of the pseudo-membranous patches, together with considerable numbers of scattering forms. Among the latter were a few staphylococci pyogenes aureus.

Case XXII.—*Clinical history:* Child, six days old. Developed severe umbilical phlegmon. Three days after this, diphtheria appeared, with severe local and general symptoms, with death on the following day. *Autopsy,* twenty-six hours: A dense, thick, firmly adherent membrane on the posterior surface of the epiglottis, extending down over the vocal cords and into the larger bronchi; commencing broncho-pneumonia, with much pulmonary congestion; parenchymatous degeneration in kidney. *Bacterial examination—Morphological:* In the false membrane enormous numbers of cocci, mostly single and in pairs, but many were in chains and irregular clusters. Many similar cocci were present in the lymph spaces of the submucosa and in the mucous glands of the trachea and larger bronchi. *Cultures: Streptococci* in large numbers. Staphylococcus pyogenes aureus. A few colonies of large bacilli resembling bacillus subtilis. Cultures from the tissues about the umbilical phlegmon revealed large numbers of streptococci and staphylococcus pyogenes aureus.

Case XXIII.—*Clinical history:* Female, six years. Taken sick on Monday, with croupy cough and dyspnœa. No pseudo-membrane was visible. There was no evidence of systemic infection, but the dyspnœa increasing, tracheotomy was advised and refused by the parents. On Monday the child died. *Autopsy*: No pseudo-membrane in the pharynx. A dense, voluminous pseudo-membrane extended from the base of the epiglottis to the bifurcation of the trachea; this was firm and closely adherent above, leaving raw, rough surfaces when pulled away. Microscopical examination showed that, especially above, the pseudo-membrane had involved the external layers of mucous membrane *Bacterial examination—Morphological:* Few scattering bacteria were present in the pseudo-membrane, mostly on the surface; these were mostly larger and smaller short, stout bacilli. *Cultures:* No streptococci and no staphylococci were found. There were two forms of bacilli in considerable abundance, one a form common in the healthy mouth, and the other a short, plump, round-end bacillus. There were three or four scattering forms, mostly bacilli.

Case XXIV.—*Clinical history:* Female, two and a half years. Croupy cough, dyspnœa, no membrane in pharynx, but strips of membrane coughed up. Constitutional symptoms became graver; tracheotomy; symptoms of broncho-pneumonia; death on the sixteenth day. *Autopsy,* twenty-four hours: Voluminous membrane in larynx, and trachea softened and loose below; no membrane in pharynx. Commencing broncho-pneumonia. Kidney swollen, cortex white and thick. Liver and spleen normal in appearance. *Bacterial examination—Morphological:* Pseudo-membrane thickly permeated by cocci, diplococci, and streptococci, with a few other scattering forms. Streptococci in considerable numbers in the lymph spaces of the submucosa. A few in the ducts and acini of the tracheal mucous glands and in the tracheal lymph nodes; large numbers of streptococci in the tissues about the tracheotomy wound; no bacteria of any form found in the kidney, liver, or spleen. *Cultures: Streptococci* in enormous numbers in the membrane with

few scattering forms. Pure cultures in large numbers of streptococci in spleen, lungs, and liver. (Kidney cultures lost by accident.)

Before proceeding to study the characters and life-history of the streptococcus, to the importance of which our studies thus far seem to point, we will group the cases of diphtheria examined and briefly summarize the results.

(To be concluded.)

ON THE USE OF HYPNOTICS, SEDATIVES, AND MOTOR DEPRESSANTS IN THE TREATMENT OF MENTAL DISEASES.

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Four cases out of five of recent mental disease have either sleeplessness, or active brain excitement, or morbid motor activity, as part of their symptoms at some time. The other symptoms present, mental and bodily, often seem to be of less importance than those to the patient's relatives and to his physician. Their urgency and troublesomeness seem to call for direct and immediate medical treatment in a very large number of such cases. While as physicians we fully recognize that these are symptoms, and not the disease itself, yet they all so manifestly tend toward brain exhaustion, that it is very natural to adopt means for their relief. And the most obvious medical means are the use of hypnotic, sedative, and motor depressant drugs. I do not say that such drugs are as curative as they seem, though I fully admit that their use is sometimes curative. And few practitioners but frequently find their use inevitable. The temptation to use them is sometimes overwhelming. But the dangers of using them to excess are great and numerous. I hope I am not wrong in the opinion I have formed that as they have been used they have often done more harm than good as regards cure, though it may be said that the sum total of the present relief they have afforded has been so great a boon to the sufferings of humanity, that their disuse would be a cruelty not to be thought of.

To go into their use fully in each form and phase of mental disease, in each several temperament, diathesis, and age would require a treatise, and our knowledge is not yet exact enough to enable anyone to do so. Even fully to state the principles that should guide us in their use, so far as I know them, and the risks to be guarded against would take up much time. Now-a-days most of us want to take our medical reading in a concentrated form. I have had much experience of their use and some proofs of their abuse. I have experimented carefully with many sedative and hypnotic drugs, but I find it very difficult to condense my experience, and lay down rules or principles of general application that would be of use to others.

When one considers for a moment the conditions of giving hypnotics and sedatives, it is seen how complicated those conditions are. We are giving drugs to act primarily and chiefly on the functions of the cerebral cortex, that representation of all organs, the co-relator of all functions, the differentiator of all sensations, the only true originator of the higher activities, mental and bodily, by far the most delicate and the most complex of organized structures in nature. It is the great inheritor too of hereditary qualities, good and bad, and the "seat" of mind. This governing organ, of such infinite delicacy, has gone wrong in some of its highest functions, and we send up to it through the blood course chemicals or otherwise alter its blood supply, or affect its functions by reflex influences in order to set them right. In order to have most kinds of mental disease at all we commonly need bad condition of living for many generations. The cortical protoplasm has become degenerate through its bad heredity, and is unresistive to unphysiological conditions affecting the individual, who has probably for years lived under such evil conditions. The sins of ancestry and of self at last produce their natural fruit in an attack of what we call mental disease, but which would be better named cortical disease. We then use powerful poisons in modified doses to arrest or modify cortical function. Who can think that the evil conditions of generations and the unphysiological courses of half a lifetime will be counteracted by a few doses of drugs? For we must never forget in the use of all hypnotic and sedative drugs whatsoever, that essentially they are cortical poisons and arrestors of function when given in full doses. By experimenting we have found out the doses that first stimulate and then half arrest function. But all young medical men have to learn for themselves by clinical experience the practical lesson that all neurotic medicines are in their full action poisons before they realize the fact. We use their half effects to modify nervous energizing in order that modification in one direction may arrest dangerous action in another, may stop dynamic exhaustion, and encourage trophic repair, may so diminish undue reflex excitability in nervous centres that dangerous reaction, mental and bodily, shall not take place. Such good results we try to attain while favorable conditions of life or of the *vis medicatrix* "cure" the disease. The mere statement of the problem shows its difficulties and its risks.

I would lay it down as a principle that few cases of mental disease should be treated by hypnotics and sedatives alone. They may be necessary in many cases as a part of the treatment, but there are always other indications which must be carried out to secure real and permanent recovery. To feed the patient, to restore his nervous and nutritive energy, to restore to normal action every function that is abnormal, to direct his mental working into healthy channels, to exercise his muscles and lower centres so as to get physiological and safe outlets for spare energy, to improve his controlling powers, to restore his emotional faculties by getting

him to feel natural pleasure and interest in something, to rouse his power of attention to healthy and safe objects, and by healthy and pleasant surroundings to make his environments healing—these must necessarily be our first considerations.

The questions we must always put to ourselves, when using hypnotics and sedatives, are: Are those drugs disordering any other functions, while mitigating the wakefulness and restlessness? Is the patient's mental state really improved through the sleep and quiet produced? Is the natural tendency to recover in any way interfered with? Does the patient gain or lose weight?—a most important test. If sleeplessness is the most urgent symptom, is the continued use of a hypnotic tending to restore the natural sleep habit or not? How does the patient look in the expression of face and eye after the drug sleep we have been giving him? How does he feel in the morning—refreshed or otherwise? Is the use of our drug forming a bad brain habit that it will be difficult to overcome? Is it causing a loss of the higher inhibitory power, while giving the patient present relief? There are very many cases of mental disease in the incipient stage, where what is pleasant to him is not necessarily good for the patient. There are many others where we require especially to strengthen his own volition to help his cure. An early case of melancholia that takes opium or choral may get to like these drugs so well that he will not follow out the measure that will lead to his real and complete recovery.

We need before giving such drugs to any case, first to make up our minds from the symptoms present whether it is a pure hypnotic that is needed, or a general sedative, or a diminisher of reflex irritability, or a motor depressant, or a combination of these. Different cases have such totally different symptoms in mental disease, the same person is often variously affected by the same drug at different times and phases of his malady; and the drug tolerance and idiosyncrasy are so different as between one person and another, that we have much need to select our drugs carefully for the symptom and the patient to be treated. I would put paraldehyde as the type of a pure hypnotic; the bromides and their combinations with cannabis Indica and hyoscyamus as the type of the sedatives and diminishers of reflex irritability, cerebral and spinal; hyoscyamine and hyoscine, as the type of drugs that especially depress the functions of the cortical motor centres.

The effects we may legitimately aim and hope for in the treatment of mental diseases by hypnotics and sedatives combined with other treatment are: 1. To cut short a commencing attack of melancholia or mania in some cases. 2. To reëstablish the sleep-habit of the brain in others. 3. To tide over short attacks that have a natural tendency to recover, through making the patient manageable by nurses in an ordinary private house. 4. To enable cases with severe attacks to be kept home long enough to

satisfy patients' relatives that the attack is a "confirmed" one. 5. To give needed sleep and rest to relatives and nurses. 6. To combat temporarily dangerous symptoms. 7. To take the edge off the worse symptoms of cases who are being treated during a long attack, and so letting other measures have full effect. 8. To subdue severe and exhaustive symptoms, and so save the patient's strength and life. 9. To satisfy and soothe the minds of such patients as will have some such drug. 10. To quiet screaming or noise for the sake of others.

The most common case that has to be treated by the general practitioner of medicine is that of a man threatened with melancholia, who has the preliminary symptoms of sleeplessness, depression of spirits, want of interest in anything, and irritability with fears and, perhaps, suspicions of all sorts, who has, in fact, the general symptoms of brain exhaustion. In addition to the rest, the exercise, the change, the fresh air, the fattening, easily digested food, the tonics and nerve stimulants, and the walking we prescribe for such a case, we are justified, and frequently compelled, to try a hypnotic, if fresh air and fatigue, baths, hot and cold, massage or warm bottles to abdomen do not restore the sleep. I am not in favor of opium for such a case in however small doses, because my experience is that it diminishes the appetite, and the patient does not gain, but tends to lose in weight, while a habit and a craving are apt to be set up. Chloral I once believed in far more strongly than I do now. It is a drug, the prolonged use of which, in some cases, certainly tends toward thinness, toward a haggard look in the morning, and toward diminished mental inhibition, as shown by a habit and craving for its continued use.

The drug I have used most extensively for the past two years, and like far better than any other pure hypnotic I have ever tried, is paraldehyde. This is so valuable, so reliable, and so free from risks near or remote, that I think it cannot be too widely known by the profession. It is mainly a pure hypnotic, though I have lately seen it recommended in small doses as a stimulant, and for the vomiting of pregnancy. It acts so quickly, that often the patient is sound asleep in five minutes after getting the dose. Out of about one hundred cases in which we have used it here, it caused sickness in only two, headache and disagreeable feelings in one, and a general "discomfort" in one. It does not interfere with the appetite for food next morning, nor disturb the stomach or bowels. After a paraldehyde sleep there is no headache, no lassitude, and several sane patients to whom I have given it have said that even the refreshed comfortable feeling they have after natural sleep, is present after it. That seems too good to be true in very many instances. I have no belief in any drug sleep being quite equal to natural sleep, in being "nature's sweet restorer." I am satisfied of this important fact, however, in regard to paraldehyde, that while the first part of the sleep after a dose is drug sleep, this passes gradually into what is really natural slumber. In fact it *puts to sleep*,

and nature *continues* the slumber. Another fact of perhaps greater importance still is this, the use of paraldehyde for a time will, in some cases, restore the sleep habit of brain, and its use can then be discontinued readily, and with no felt want and craving by the patients. It is of no use, but the contrary, given through the day as a sedative. It seems to act on the very highest cortical cells, and not on the motor areas cortical or basal. In cases of mania, I often add a drachm of one of the bromides to the dose at bedtime, and in very acute and restless cases a drachm of "bromida." It sometimes excites when given in too small doses.

The proper dose of paraldehyde varies enormously according to the case. Generally, I begin with forty minims or a drachm, and go up to two drachms in ordinary cases. In very many cases of confirmed insomnia in melancholia and in acute mania, I have given three and even four drachms, and in one case six drachms. I have now a general paralytic who has taken four drachms every night for a fortnight. A lesser dose did not cause sleep. Here we commonly give it mixed with tincture of quillaya and a few drops of chloral ether in cinnamon water. Its bad taste cannot be got over, and patients always smell of it for twenty-four hours after the last dose.

I do not know how much would be a poisonous dose, but a nurse once gave a patient of mine, a small-sized woman in weak health, an ounce, with the result that she slept a stertorous sleep for twelve hours, the heart's action not being interfered with, nor the reflexes, but rousing and coffee on several occasions during the night only very partially brought her to consciousness while under its influence.

I have never seen paraldehyde affect the heart's action in any way except to strengthen it shortly after being given. I look on its action as being in some respects half-way between that of ether and alcohol, but with a far more decided hypnotic effect than either.

I have had many cases in which its nightly use for periods of from one week to six has been followed at once, on its being stopped, by a restoration of the sleep-habit. The first case of that kind I had was a recent but very marked one of suicidal melancholia with restlessness in a woman at the climacteric, who, after its use for a month, at once began to sleep soundly for six hours every night, and soon made a complete recovery. The next, and the most remarkable I have yet met with, was one of suicidal melancholia with great impulsiveness, who had not slept naturally for more than an hour or two at a time for two years. As she required a special night attendant, I knew the facts accurately. She was put on paraldehyde in drachm doses every night. This dose needed to be doubled to get seven hours' sleep. This was continued every night for six weeks. She gained in weight, and took her food well during that time. It was then stopped, and the patient at once began to sleep naturally, has never needed a draught since for a period now of eighteen months, and very

soon we were able to discontinue the special night attendant. Such a case makes a very deep impression on anyone who has the heavy responsibility of treating it. The result is in accordance with the physiology of the brain so far that we know that habits and "periodicities" are normal characteristics of its functions that can be broken or restored by outward conditions.

There are some cases of very acute mania and melancholia, and especially of the acute excitement of general paralysis, where half-ounce doses will not procure sleep, and I commonly do not push it beyond this.

One impression I have very strongly about paraldehyde after two years' experience of its use in all sorts of mental disease, acute and chronic, without organic brain disease, and in the last stages of brain lesions of many kinds, in very young cases, and in the very old, in cases without complications, in those complicated by severe diseases of the lungs and heart—and it is this: I do not think I have done any harm to any of my cases by its use. I have no feeling that it has interfered with the *vis medicatrix naturæ*, or with nutrition, or with the prospect of recovery, where this was possible. No one who has had long experience of the treatment of mental disease, but has the impression that the cases that have "run their course" to recovery under favorable conditions, good nursing, and suitable food are the most satisfactory on the whole. The "recoveries" utterly outnumber the "cures" No one who has used many kinds of hypnotic and sedative drugs extensively, but has had the feeling frequently that by the means taken to subdue present troublesome symptoms he has interfered with the "course of the case," and that recovery may have been put off somewhat. I have that feeling strongly about the use of opium and choral. I have no such impression in any case where I have used paraldehyde. If it did no good, it did not do any harm. That is a great thing in any drug, if true. The cerebral cortex and its working in health and disease are so infinitely delicate, so intensely unstable, and so profoundly obscure, that any drug which acts strongly and directly on it, and yet does no harm, is unquestionably one to be greatly valued. Paraldehyde is so volatile a drug that it is readily and completely eliminated by the lungs and kidneys.

The use of mental and motor sedatives and depressants during the day in those forms of mental disease characterized by motor excitement is a still more difficult problem than the use of hypnotics at night. Such a use is far more liable to abuse and is essentially more unphysiological. The temptation toward such a use, for the present ends, is so great without reference to the "natural course" of the case toward recovery that we need to be very careful how we employ them. The heroic doses of antimony, digitalis, and of opium, the prodigious douches of old, we have now almost absolutely discarded. We see plainly that the motor quiet thus obtained was not half-way to cure, but part way to death. The

questions we ask now are: Can we conserve strength and prevent exhaustion and death through over-motor energy by the use of sedatives? Can we take off the keen edge of the motor excitement, so that some patients can be made more manageable and saved from being sent to asylums? Can we so diminish motor excitement that the patients can be safely taken out to walk and work, and so get rid of part of their spare motor energy in normal ways? Can we so diminish impulsiveness that danger to the patient and others may be diminished without interfering with recovery, or with health in incurable cases? Can we, during special paroxysms and bodily diseases, temporarily diminish motor action with safety. If excessive motor energy is generated in the brain cortex, it is surely a reasonable hypothesis, that it should generally get its natural outlet in muscular action. But there are limits to all excesses of action. If antipyrin, on the whole, does harm in an ordinary case of pneumonia with a temperature of 103° and prolongs recovery, it does not follow that a cold bath does not save a patient's life when the temperature is running above 106°. Patients sometimes die of the exhaustion of over-motor excitement. How do we know in any such case that if over-exertion had been controlled by drugs or mechanical restraint for a few days, the crisis might not have passed in the ordinary "course of the case."

There is, in my opinion, legitimate scope for the use of sedatives and motor depressants in mental diseases both from physiological and clinical data. Which are the best and safest measures and drugs to use? A categorical and unconditioned answer cannot be given to this question. Of one thing I am quite sure from my experience. Do not use during the day a pure hypnotic like chloral or paraldehyde alone or in combination as a sedative or motor depressant. That is the weak point of "bromidia."

Another principle which I laid down twenty years ago I still adhere to: Use the bromides in combination with nearly all sedatives and motor depressants. They make a lesser dose of the latter more equably and more safely effectual as compared with a large dose given alone. They prolong the sedative effect. They diminish motor reflex excitability in the whole of the motor centres, and they may be said to strengthen the whole function of inhibition thereby. They are very safe and do not tend to affect nutrition, but often the contrary. The combination of the bromides with cannabis Indica, which I recommended in 1868, and have used continuously since, I still think one of the best sedatives, because it is mild in general effect, and does not affect the nutrition. Patients often gain in weight during its use, they can work and walk while under its influence, and impulsiveness of all kinds is diminished by it.

My original experiments which were very carefully made, have been confirmed in the main by a very large subsequent clinical experience. Not that all my hopes and expectations of twenty years ago in regard to

the curative effects of this or any other sedative on cortical brain excitement have been realized. Few men have had to treat diseases for twenty years who are not at the end of the time more sceptical about drug treatment, and more inclined to trust to the *vis medicatrix* under favorable conditions than they were at the beginning, on the whole. There are marked exceptions, no doubt, and the use of this combination as a sedative, motor depressant, and diminisher of reflex irritability in mildly maniacal cases, in certain cases of acute mania with hysterical symptoms and noise in women, in epileptic mania not of the unconscious delirious type, in chronic mania with paroxysms of exacerbation, in all cases of brain excitement with more or less regular periodicity of symptoms, and in many cases of suicidal melancholia characterized by motor excitement and homicidal violence—in all these I have used this combination, and found it an admirable sedative without disturbance of digestive functions and without loss of nutrition in a very large number of cases. I always weigh my patients while they are taking any sedative or hypnotic drug, and if there is a continuous loss of body-weight I am inclined to stop the medicine and try how the case will run on without it. I commonly now begin with ten minims of the tincture of cannabis and thirty grains of one of the bromides for a dose, rising to forty-five minims of the former to a drachm of the latter. I commonly add some aromatic spirit of ammonia to the mixture as a cardiac stimulant, and also to keep the resin more in solution. The most alarming symptoms I have ever seen after its use in large doses resulted from the temporary failure of the heart's action in one anæmic case of chronic mania after a drachm dose of the tincture of cannabis with a drachm of bromide, and in another instance from a semi-comatose condition in a case of *folie circulaire* during the excitement which I was attempting to "keep in check" by a continuous use of the mixture. In the former kind of case I now add some digitalis. In other cases, and for special indications, I am in the habit of adding the ammoniated tincture of valerian to the combination. This does specially well where there are hysterical symptoms. I sometimes add a little lupuline, hyoscyamus, or belladonna.

The cannabis Indica often increases the appetite and acts on the kidneys. The taste of this mixture is very bad, however, and we often have much difficulty with maniacal and suspicious cases on this account. In some patients a few doses will be sufficient for the purpose we aim at, in other cases the drugs have to be given for weeks and even months. I have a case of *folie circulaire* now, who during the excited part of the cycle is a noisy, shouting nuisance in the ward, but when under the influence of this combination remains in a comparatively calm, confused condition till the quiet cycle of the disease comes on. I have certainly kept many patients out of asylums by its use. When the excitement is very intense, and tending toward "delirious mania," with dry tongue, sordes, and

repugnance to food, then I cannot recommend this combination, nor indeed any other sedative, hypnotic, or narcotic drug. Nursing, stimulants, suitable feeding, tonics, and fresh air are in these circumstances alone to be relied on, if we wish our patients to have the best possible chance of recovery. In general paralysis and the excitement of organic brain disease I have often seen the combination give great relief and quietude without any ill-effect.

The following were the chief bodily effects I observed after the use of this combination of cannabis Indica and bromide in cases of maniacal or melancholic excitement with motor restlessness: The temperature, especially the evening temperature, fell, the pulse was slightly increased in frequency and weakened in force, the weight increased through good feeding and the use of much milk and eggs, the appetite improved, the digestion and action of the bowels were not interfered with, the motor restlessness became much less marked, and in some cases motor quietude supervened. Nervous and reflex irritability were diminished, a drowsy calmness and deadened mental reflexes taking its place. The tendency to widening of the area of nervous and mental reflex irritations when excited in one area by slight irritants did not take place, as is apt to be the case in mania.

The mental results were the following: There was less sudden impulsive action, the constant talking got less, the tendency to shouting was lessened or stopped, there was less resistiveness to control, there was a drowsy quietude induced. The emotional state was one of greater happiness, and intellectually there was less suspicion. In some cases hallucinations of hearing abated. In many cases walking and working could be engaged in. Inhibition was improved.

If judiciously given in suitable cases in small doses to begin with, gradually increased until the effect we wish is produced, I estimate that good results are obtained in from sixty to eighty per cent. of them.

The following symptoms should in my judgment make us hesitate to use the combination or stop its use, viz., a very weak, thready pulse, a very foul, creamy tongue increasing under the use of the drugs, a dry tongue and mouth, an increase of motor paralysis, a difficulty in equilibriation and walking, a tendency to stupor, very cold extremities and pinched face as if the general nervous and vital energy was very low and diminishing.

If a pure motor depressant is indicated, there is no doubt that hyoscyamine and hyoscine are the best drugs to get the effect of simple motor quietude. I have many cases of mania where the chief symptoms, and by far the most troublesome, are excessive restlessness, shouting, tearing, violence, and motor impulsiveness of all kinds. All the morbid energizing of the cortex seems in such cases to be concentrated in the motor centres. Such patients are always troublesome, sometimes dangerous to

others, and many of them tend to exhaust their strength to a dangerous extent. Now if any such a case is in strong and vigorous general bodily health and has a sound heart, hyoscyamine or better still hyoscine may be tried in small doses of $\frac{1}{80}$ gr. of the former and $\frac{1}{200}$ gr. of the latter, carefully watched. The risks of their use are undoubted, but the good results in some few cases are also marked. Unfortunately, hyoscyamine produces in patients a condition of great, sometimes excessive, mental pain, for they dread its use exceedingly after having had it once. They are apt to look on it as a punishment and to resent it accordingly. For that reason and also because I once had very alarming temporary narcosis with paralysis in a strong man after using it I have given up the use of hyoscyamine. Its effects were far too like those of a club that simply knocked the patient down. But hyoscine in doses beginning with $\frac{1}{200}$ gr. given hypodermatically and going up to $\frac{1}{80}$ gr. is, so far as I have yet used it, a safe and a moderate depressant of voluntary motion, without narcosis or much mental confusion or drowsiness. So far as I have yet observed its effects, it is the best drug for this special effect. It has not in my cases affected the appetite, nor depressed the heart's action unduly. I must say I have been afraid to push it in very restless and violent cases. Several strong persons of this kind laboring under acute mania resisted $\frac{1}{80}$ gr., and I was afraid to push it further after my experience of hyoscyamine. I should not give it in general paralysis or in any case in which I suspected organic brain disease.

I shall conclude with a few principles of general application:

1. Make up your mind clearly from the symptoms present whether your patient needs a pure hypnotic, a general nervous sedative, or a simple motor depressant before you use any of these drugs.

2. Use all such drugs experimentally in each case at first, and watch their effects not only on the higher nervous functions, but on all the organs and their functions; and on the general organism.

3. Even when there is sleep and quiet produced for the time with no apparently bad results, look to the general feeling of *bien-être*, the recuperative energy, the expression of face and eyes after their use, and see if there is any undue reaction as if some energy that must have an "outlet" were merely being "suppressed" for the time being.

4. Stop using such drugs as soon as possible, trying experimentally how the patient gets on without them.

5. Keep asking in every case, "Are we sacrificing in any degree the highest function of mental inhibition by their use?"

6. Never omit general measures for the restoration of the health, nutrition, and higher nervous functions while you use such remedies.

7. Paraldehyde is the purest and least harmful hypnotic yet introduced when the insomnia is marked and intractable. Urethan and sulphonal

cannot compare with it. Opium and chloral have special dangers and disadvantages.

8. Use the bromides as accentuators and prolongers of the effects of other drugs, and in order to be able to employ smaller doses than otherwise.

9. A combination of cannabis Indica and the bromides is the best and least harmful of general sedatives.

10. Hyoscine is the best pure motor depressant; but it needs care.

11. We never should narcotize an insane patient or one threatened with mental disease.

12. It is as dangerous to use more anodynes by the mouth or subcutaneously to relieve mental pain, as to subdue bodily pain by these means only, perhaps more so.

13. It is generally far better therapeutics to enable your patient to bear his mental pain and the effects of his insomnia by improving his general nervous tone and the nutrition of his body than merely to produce quiet and sleep by drugs.

14. It is commonly a safer thing for the patients, and tends more toward natural recovery from his disease, to provide a physiological outlet for morbid motor energy than merely to depress it directly by drugs.

15. It is almost always preferable to treat cortical exhaustion, irritability, and undue reflex excitability by rest and by improving the fattening and nutrition of the body than by continuous sedatives, the great exceptions being the treatment of epilepsy and convulsive affections by the bromides.

CAVERNOUS ANGIOMA OF THE LARYNX. REMOVAL.[1]

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With Drawings and Descriptions of the Microscopical Sections,

Prepared by Dr. Ludwig Bremer,
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Angiomata of the larynx are exceedingly rare growths. The text-books on laryngology mention them, but few writers claim to have seen them in their own practice. A search of the literature at my command has given reports of only six cases, viz., Fauvel (*Mal. du Larynx*, pp. 545–606) reports two cases; Heinze (*Archives of Laryngology*, June, 1880) reports one case; Elsberg (*Archives of Medicine*, February, 1884)

[1] Read at the tenth annual Congress of the American Laryngological Association, Washington, 1888.

reports two cases; Kidd (*British Medical Journal*, March, 1888) reports a case with description of the microscopic section; Mackenzie (*Diseases of the Throat and Nose*, p. 307) mentions one case of angioma of the larynx, situated on the false cord, and again (in *Essays on Growths*, p. 88) he reports a vascular tumor situated in the hyoid fossa. Of the former I can find no account, save the simple statement. The latter cannot strictly be classed as a laryngeal growth.

The case reported by Johnson, 1865, as a vascular cyst situated at the anterior angle of the vocal bands, and the case of Fournie, of a melanotic growth on the epiglottis, cannot in the absence of a definite description be classed among the angiomata.

With the exception of the case mentioned by Mackenzie, all the angiomata hitherto reported have been of soft consistency, and situated at or near the anterior commissure of the larynx.

During the latter part of August of this year, I was consulted by J. K., a man aged thirty years, a maltster, on account of a persistent hoarseness. He stated that during March of the present year he had first noticed a hoarseness, but, as it was ascribed simply to a cold, it gave him no concern. About July he began to notice an impediment in his speech; the voice would break suddenly at times, and a short cough or the act of swallowing would be necessary to clear it. He had no other symptoms, and his general health was perfect.

When I first saw him, his voice was hoarse and slightly marked by the broken tremor recognized as tumor voice. There was no dysphagia, dyspnœa, or cough. On laryngoscopic examination, a grayish-browm mass, the size of a large pea, was seen attached to the anterior part of the left vocal cord—the tumor was lobulated; a portion reached the commissure and another portion was attached by a pedicle to the surface and edge of the cord; this permitted it at times to fall below the cord and to be partly hidden from view on phonation; a short cough would always bring it between and above the cords. The glistening œdematous appearance of the cord about the growth, corresponded in a striking manner with that so well described by Kidd in the report of his case.

After the application of a twenty per cent. solution of cocaine to the larynx, the greater part of the growth was removed in a mass with the Schroetter tube forceps; it proved to be very soft, and the hemorrhage was no more than that following the removal of an ordinary blood-cyst, scarcely a small teaspoonful altogether. The base was cauterized, and the patient soon regained the control and tone of his voice. After a lapse of four months, there has been no sign of recurrence.

The portion removed was submitted to Prof. Ludwig Bremer, of St. Louis, and the accompanying drawings, microscopic sections, with a full microscopic description of the tumor, were prepared by him.

I feel fully assured that these microscopic specimens are unique in their beauty, and the description of the microscopic appearance of the tumor is the most complete in its details of any yet placed on record.

The slide with the microscopic section is now in the National Museum at Washington.

The tumor is about the size and form of a large pea; its base is somewhat flattened. Its color is bluish-gray flecked with small bright red spots at the apex. The surface of the latter is glistening and polished, whereas that of the sides of the tumor is slightly roughened and velvety. This difference in appearance is explained by the microscopical examination as follows:

At the apex the epithelial covering is very much reduced in thickness owing, no doubt, to friction and pressure from an opposite surface; in places it has entirely disappeared, being replaced by dense fibrous tissue. The red spots are small hemorrhages.

Sections made vertically to the base through the whole thickness of the tumor, reveal the following facts:

In the unstained specimen a number of reddish-brown spots are visible, embedded in a transparent tissue. The spots give, on coarse inspection, the impression of being hemorrhages into the mass of the tumor. Examined with a moderately high power (250×—300×), it is seen that in reality they are made up of blood and a network of trabeculæ varying in thickness, the whole being surrounded by a more or less circular ring of connective tissue.

Sections stained in fuchsine, dehydrated in alcohol, and preserved in Canada balsam, show the following under a low power (Bausch & Lomb, A 1 in.): About one-half of the whole tumor-mass appears in the field; its periphery is undulating. The uppermost layer of the epithelial covering is stained deep red, the rest pale violet. The thickness of this cover is variable; in some places it is hypertrophied. In one spot it is undergoing mucoid degeneration, the cells being very much swollen, their contours only visible, of oval shape, the nuclei gone. The color of the bulk of the tumor appears, on the whole, reddish-blue, excepting the blood, which is stained yellow, and a number of spots in the centre of the tumor, which look intensely red. Here, as will be seen further on, is the centre of nutritive activity.

Examined with a higher power (300×), the sections present a variety of structures in different parts, alveolar reticular, myxomatous, and fibrous. What appears macroscopically as hemorrhagic foci, looks now like organized thrombi, in which trabeculæ of variable thickness, dividing and subdividing, are seen to form a network, the meshes of which are, on the whole, elongated in form. These meshes are filled with red blood-corpuscles; occasionally a white one is visible. The septa, especially the more voluminous ones, are beset with what appears like endothelial cells.

The stroma surrounding the blood-containing network is made up of dense fibrous tissue, from which the trabeculæ are seen to emerge and branch out; in other places, however, the fibrous rings are not so well defined, the network becoming more and more narrow-meshed at the periphery, and passing gradually into the dense stroma.

A very peculiar appearance is presented under a high power (about 350×—400×) by the intensely colored central portions referred to above. In fuchsine preparations which have been bleached by the prolonged action of alcohol, very large spindle- and star-shaped cells are seen to arrange themselves into a network containing red blood-corpus-

FIG. 1.

Three contiguous alveoli. *a*, centre of greatest activity: formation of network by large spindle- and star-shaped cells. *b*, formation of mature connective tissue. *c*, *c*, *c*, blood corpuscles. *d*, accumulation of leucocytes: possibly an inflammatory focus. × 300 reduced.

FIG. 2.

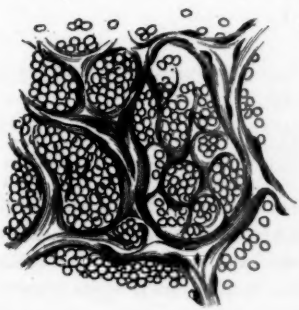

FIG. 3.

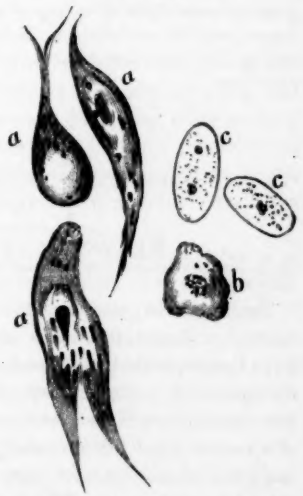

Fig. 2.—Portion of the tumor showing voluminous connective tissue, trabeculæ, and comparatively small alveoli. The larger alveoli are subdivided into smaller ones and lined with endothelia. × 300.

Fig. 3.—Giant spindle-cells. *b*, a spindle cut across. *c*, *c*, large nuclei with invisible protoplasm; probably the juvenile stage of the spindles. × 300, Leitz 1-12th immers. Oc. 1.

cles. A part of these *giant-spindles* are in a state of transition into connective tissue, after the fashion of fibroblasts, their voluminous protoplasmic branches passing gradually into the mass of the neighboring fibrous stroma (Fig. 3 and Fig. 1 a).

Wherever the alveolar arrangement predominates, the trabeculæ forming the blood-spaces are lined with distinct cells, serving as endothelia. The meshes are of all sizes, some of them so minute that, on a plane, they contain only three or four red blood-corpuscles (Fig. 2).

In some few parts of the tumor, the myxomatous character predominates in structure; always, however, with a tendency to pass into the fibrous state. It is at the periphery of the myxomatous patches where the transition stage can be easily seen. (The myxomatous formation may, however, be interpreted as a degenerative process, especially since the large granular cells in the meshes are missing. This point I leave undecided.)

On the whole, a tendency prevails throughout the tumor to form firm fibrous tissue, which points to a benign nature. The histogenetic features are clearly indicated in the deeply stained central parts. Here the large branching cells develop, uniting with each other by their protoplasmic offshoots, thus resembling myxomatous tissue. A connection with the previously existing blood channels is established, and now one of two things may happen. Either the branching cells are excessively nourished, passing into fibro-blasts, and in this case the meshes are small, containing very little blood, the tendency being toward their complete obliteration and the formation of mature connective tissue; or the pressure of the blood may be so considerable that the trabeculæ formed by the protoplasmic connections of the branching cells remain comparatively thin, the blood predominating over the stroma. The tumor in general resembles a sponge; it is a cavernous growth. Nowhere are there true bloodvessels to be seen; nowhere smooth muscle-fibres indicating the presence of true bloodvessels. The diagnosis is "cavernous angioma."

ON THE OPERATIVE TREATMENT OF STRUMOUS ARTHRITIS OF THE KNEE.

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There are at present in the wards of the Edinburgh Royal Infirmary under my charge, five cases of strumous arthritis of the knee. They have been operated upon, and their wounds have all healed without the formation of a single drop of pus. One is a woman, aged twenty-five years, whose limb I have amputated above the knee; three are cases of excision, aged fifteen, twenty-three, and twenty-seven years; and one is a child, three years of age, in whom I have cut away the diseased synovial membrane. They are, therefore, typical of the varieties of operative treatment for strumous arthritis, and may serve as text for a few practical observations.

In a preliminary way, I would strongly emphasize the proposition that strumous arthritis is eminently curable. Tubercular disease, if it does not attack vital organs, generally is so. In the struggle for existence between the elemental tissues of the body and the intrusive bacillus the latter is often worsted.

The study of the conditions which favor one or the other of these antagonists is of the profoundest interest to the clinician, and, without depreciating other factors, we may take for certain that one essential, or at least invariably applicable, condition of successful treatment, so far as surgical and probably also medical forms of tubercular disease are concerned, is the enforcement of absolute rest. It would be interesting, but not germane to our present subject, to speculate on the *modus operandi*, and to inquire how rest, which leads to atrophy of the tissues of the body, should at the same time enable them to destroy the vitality of the intruders. It may be that in the effete products of work microbes find a suitable soil. Suffice it, however, that rest *is* effective, and that, if made absolute, or, as it is called, physiological, it rarely fails to cure.

But, while this is so, the difficulty of applying it in any adequate way is sometimes very great. In certain parts of the body it is impossible, although I venture to maintain that often, as, for example, in strumous glands, the possibilities are not sufficiently utilized by the surgeon. In the poor, again, as compared with the rich, the necessary time is not at our disposal. Among the upper classes the rarity of operation for strumous disease is largely due to the fact that immobilization can be maintained over a sufficiently prolonged period of time.

It is a common history among our hospital patients, that steady improvement continues so long as they are kept in the infirmary, and that relapse occurs on their resumption of the work that they must perform in order that they may live. After, it may be, frequent repetition of this alternation, an abscess forms and opens. The too common sequel is that, having opened, it becomes septic; having become septic, the disease makes more rapid progress than before.

There can be no doubt that the influence of the different forms of microbes upon each other is very various. Some are antagonistic. There is an antagonism between the microbe of erysipelas and that of tubercle. Fehleisen has shown it in lupus. I have observed it in strumous arthritis. I have before me the case of a boy in whom I excised the elbow. Septic at first, it remained so after operation, and, notwithstanding scraping out of the sinuses on more than one occasion, they would not heal, and persistently exhibited characteristic strumous granulations. One day he came to the infirmary, and was sent to the Contagious Hospital on account of erysipelas. With the subsidence of the erysipelas the sinuses quickly healed. The case is not isolated in my experience, and I have myself no doubt of the antagonism. On the

other hand, the microbes of putrefaction and tubercle are adjuvant to each other in the human body. If a strumous arthritis become septic, the prognosis becomes at once most serious, and the too frequent result is exhaustion, hectic, amyloid degeneration, and death.

Such, then, is the common history of a hospital patient with strumous disease of the knee. I do not deny that the disease may be arrested spontaneously, even in the poor, at any stage of its progress. But with them it is a dangerous disease, and we have often to consider what measures should be taken when rest fails, either because it cannot be adequately or long enough applied, or because the important hygienic adjuvants are wanting. These circumstances naturally, also, may determine the sequence and period of application of these measures, both in relation to rest and to each other.

If, then, rest fail from one cause or another, surgery has three operative resources. I say nothing of simple incision. If it be time to incise in strumous arthritis of the knee, it is time to go further, for its curative value is less, and its risk nearly as great, as that of other operative measures.

The three operations are:

1. Partial excision.
2. Complete excision.
3. Amputation.

Let us take them in that order.

Partial excision is a method of operating of ancient date, rendered obsolete for a time by complete excision, but recently revived in improved form under the name of arthrectomy. The reason for the revival is the increased safety which is given to it by the antiseptic system. That system has so reduced the mortality of all these forms of operation as to make it an element of much less importance than it was formerly in determining the choice between them.

Arthrectomy, then, or partial excision, consists in the removal of all palpable and obvious portions of diseased texture, whether in synovial membrane, or elsewhere, without regard to what is left, provided only it be apparently sound. That, I think, is a not unfair description of the operation, and I use the words palpable and obvious, because no one, I suppose, will contend that it is possible, in such an operation to insure, or even render probable, the removal of all texture in which the tubercle bacillus exists.

Two advantages are claimed for this operation. It is asserted, and with some truth, that, unlike the other methods of operating, it does not interfere with the growth of the limb. This advantage, of course, applies only in the case of children. But it must not be forgotten that arrestment of growth is often the effect of the disease. A very frequent situa-

tion for the development of tubercle is the epiphyseal junction, and a common result is the ossification or destruction of the point of growth.

A second advantage has been claimed for arthrectomy, that mobility of the joint can be thereby preserved. There is in my wards at this moment a young woman on whom I operated nearly three years ago, by removing with scissors and sharp spoon the whole of the gelatinized synovial membrane of the knee-joint. The wound healed by first intention, and, till three weeks ago, she has been able to walk about and freely use her knee without pain up to a right angle. She has come back now because of a little pain from prolonged standing and walking, which has completely subsided with a fortnight's rest. About the same time, in a child, I erased a large part of the external condyle of the femur and the whole of the synovial membrane. It required long rest in splints, but for a year and a half she has been walking about without pain and with slight but useful movement of the knee. I look upon them, however, as quite exceptional, and I think that all arthrectomists now advocate prolonged rest after operation, and aim at ankylosis, if not osseous, at least as firmly fibrous as can be obtained. And undoubtedly they are right in so aiming. There are great risks in a remanent mobility. I have, in one instance, been obliged to excise the joint in a little boy on whom, a year and a half previously, arthrectomy had been performed by another surgeon. There had followed complete cure of the disease, and the ankylosis was so firmly fibrous that it was only with care that any movement could be detected. Nevertheless, under the strain of walking the knee had gradually become more and more bent, until it was nearly at a right angle, and the patient could only walk on his toes. Moreover, sudden strains or falls were apt to produce severe pain, lasting on each occasion for a day or two. Therein, in truth, lies an important difference, so far as the after-consequences of both arthrectomy and excision are concerned, between a prehensile organ like the arm, and one meant to bear weight like the leg. Fibrous bands will stand much strain in the way of direct tension, but little in the way of pressure or lateral jerk.

Another disadvantage of even very slight remanent mobility lies in the fact that it greatly increases the chance of recurrence of the disease. After excision of the knee, if osseous union occur, the disease is cured; and of a large number of such cases I have met with only one in which the disease recurred. I excised the knee in a lad of eighteen years, a patient of Dr. Young, of Addiewell. Osseous ankylosis followed, and, for more than a year, the limb was perfectly sound and useful. He was, however, a very strumous subject, having suffered much from suppurating glands in the neck, and he was lately brought back to me with recently formed sinuses, which led down to carious bone on the posterior

surface of the tibia. I scraped with Volkmann's spoon, and he is now well. It is, in my experience, a solitary case.

There is a distinct difference in this respect, also, between excision of the knee and excision of the elbow. I put aside cases in which the operation has been performed under septic conditions, although I believe the same observation applies. But in excising with unbroken skin, the rule is, that union takes place by first intention. In such a case osseous ankylosis of the knee is fairly certain, and also free mobility in the elbow. I have only once seen this recrudescence of the disease in the former when ankylosis was osseous. I have three times had to lament it in the latter. Take one as an example: I excised the elbow in a lad of fourteen years, and having taken care to arrest hemorrhage, to remove all palpable disease, and to avoid antiseptic irritation, I secured union absolutely by first intention, no drainage tube having been introduced. For six weeks everything progressed admirably, but at the end of that time the parts became slightly swollen, the cicatrice assumed a broad, puffy, bluish appearance, and sinuses with pouting granulations slowly formed, and were only healed by prolonged rest and scraping. The ultimate result in this case, as in the other, was good, but only attained with care and anxiety, and I attribute the untoward condition solely to the necessity for maintaining the mobility of the joint by daily movement. Nor can it be said that this movement was excessive, for I avoid entirely the old rough and pump-handle treatment, and confine myself to extension with a light weight during the night and carriage in a sling with very gradually increased flexion during the day.

Now, in arthrectomy of the knee, in which it is difficult to secure osseous ankylosis, because soft parts may be allowed to remain and surfaces are unsuitable, this risk is always present. I have experienced it in two cases.

A young woman, one of the five first mentioned, had the synovial membrane very carefully removed by means of long incisions, one on each side of the joint, in May, 1886. Union took place by first intention, and for four months the patient wore a plaster case. For a time she was able to walk with considerable movement of the joint, but for a year the leg has been under almost constant treatment at home, and when she returned to the infirmary, two months ago, I felt constrained to excise. Another was yet more unfortunate. In a child, six years old, I employed arthrectomy in May, 1888. The joint healed absolutely by first intention, and after healing was enveloped in a starch and poroplastic case. The joint was not again seen till twelve weeks after the operation, when a sudden rise of temperature occurred, and, on examination, an abscess was found to have burst and become septic. Under this the child went down so rapidly that, during my absence in September, Dr. Hodsdon found himself obliged to amputate to save the patient's life.

My experience, then, of arthrectomy is this:

Age.	Number of cases.	Result.
21	1	Perfect cure with thoroughly sound limb and mobility up to a right angle.
7	1	Perfect cure with slight but useful mobility.
14, 18, 23, 25	4	Cure with either osseous or close fibrous ankylosis and fairly useful limb.
23	1	Recurrence of the disease and subsequent excision.
6	1	Recurrence of the disease and subsequent amputation.

My conclusion, therefore, in reference to the operation, based on my own experience of it, and not contradicted by the published results of other surgeons, is that it ought, meanwhile at least, to be very strictly limited. The cases in which it may legitimately be tried are, in the first place, those only in which a thorough and prolonged treatment by rest has been unsuccessfully employed. If the patients come under observation early, this want of success should be rare. A second limitation should be to those in whom the skin is as yet unbroken, because the operation being less thorough, the drainage more difficult, and complete ankylosis less sure, recurrence of the disease is more probable, and the risk of the procedure not less than with more radical treatment. Again, it should be employed chiefly in children; because in them only can the main advantage, continuance of growth in the limb, be of any avail, and in them only may the accidentally favorable mobility be legitimately in some cases expected. I would not assert that further extension should not be given to the operation in exceptionally favorable cases, when, for example, the personal and family history are free from tubercular taint, the patient is otherwise robust, and the disease slow and not purulent. But a thorough trial by rest, youth, and asepsis seem to me nearly essential conditions.

For other cases of strumous arthritis we have the choice between excision and amputation, and I must say that with extended experience I am inclined to increase the number of cases in which I recommend amputation. I suppose that in all cases amputation is comparatively safer, and the point to be determined is where the line should be drawn which indicates that the greater safety is counter-balanced by other advantages. It may plainly vary with variation, either in the element of risk or in the benefit derived by retention of the limb.

And first, it may safely be said that the danger attending either amputation or excision in a young and healthy person with unbroken

skin, is so small that the difference in risk between these operations may be treated as a *quantité négligeable.* In such, therefore, there can be no doubt of the propriety of preserving the limb, provided always that the disease can thus be fairly removed. I should not insist that it be absolutely and entirely removable, because, undoubtedly, the removal of the major part of the disease, and the relief of tension and the completeness of immobilization in many cases will allow the vitality of the texture to reassert itself and overcome the small portions of disease that remain. But I regard total removal as an important object for several reasons. These are, first, that a remanent focus of tubercular disease implies a long-continued threat of recurrence; second, that osseous ankylosis is more difficult to obtain when tubercular foci are present; and third, that dissemination of tubercle through the system is a result which does arise more frequently than is generally acknowledged when a large, raw surface, especially of bone, is exposed to tubercular infection. There can be no doubt that in the lower animals tubercular disease may be produced by inoculation. The conditions of such inoculation seldom, of course, arise in the human being, but the following case is one of considerable interest in this connection.

A woman, aged thirty-six years, was admitted to the Royal Infirmary in November, 1887, suffering from three nodules on the hand, each about the size of a walnut. Two were close together on the back of the hand over the fourth and fifth metacarpal bones, one about an inch away over the lateral aspect of the wrist. The lowest had already opened, and all presented the clinical aspect of tubercular abscess. The history was that, in washing some handkerchiefs impregnated with sputum from a sister who was dying of phthisis, she deeply pricked her hand with a safety-pin attaching them together. The little wound inflamed slightly, and a few drops of pus came out, but it healed again in a week or ten days. Seven or eight weeks subsequently, a nodule began slowly to form at the spot; a week or two later a second, higher up; and the third on the side of the wrist, considerably later still. I scraped them out and passed drainage tubes from one to the other, finding them connected by diseased texture, and after a second scraping, six weeks afterward, they healed soundly. The tubercle bacillus was found in the scraped-out material.

It is easy to understand, and it is consistent with experience in operations for tuberculous disease, that the raw surface may become inoculated by diseased matter left behind, and the progress of the disease be more rapid than before.

If this danger of recurrence exist, it is plain that in such cases osseous ankylosis must be difficult to procure, and, indeed, there can be no other reason for the long delay in attaining it, and the occasional total failure which occurs in excision of the knee. A fracture through cancellated texture rarely fails to unite. The difficulty rather is to prevent an ankylosis of the neighboring joint. Now, an excision is specially prepared for

union; the surfaces are made as broad as possible, and usually special apparatus, as sutures of wire, are used to secure accurate apposition. But there can be no doubt that delayed union is common. In most of my excisions I find that mobility can be detected easily at the end of eight, ten, and twelve weeks in almost every case, and I do not find that union is more rapid in aseptic cases, which heal by first intention, than in those which have been done through septic sinuses, and which I have failed to render sweet. I think it not impossible, indeed, that the aseptic condition may diminish the rapidity and certainty of osseous union. I have been inclined to think that, so far as osseous union is concerned, operations for ununited fracture were more successful in old septic days than now. Much more dangerous they doubtless formerly were; but, if they did not kill, they succeeded, presumably from the hyperæmic results of inflammation. But this is not an adequate explanation of delay in excision. It is, if aseptic, precisely in the same condition as a simple fracture or a compound fracture kept aseptic. As in operations for ununited fracture, so, in excision for strumous disease, there must be some factor special to the condition which involves delay, and in the latter this lies, doubtless, in the state of the texture brought about by the disease, and which must be aggravated if foci of tubercle be left behind.

But again, after operations through strumous tissue there is a danger of dissemination of tubercle. This occurs in two ways. Much against my will I operated by excision in a case of tubercular disease of the knee-joint in a young man in whom the disease was so extensive that I strongly advised amputation. He would not submit, and died of miliary tubercle, chiefly in the lungs, a few weeks afterward. These cases have, I think, sometimes been regarded as septic poisonings, to which, in many respects, the symptoms bear a close analogy. They certainly occur more often than is generally supposed, and especially after operations in which large surfaces of bones are exposed, and in which perfect drainage from these surfaces is in the nature of things impossible.

The other mode of infection has, also, I think, failed to attract adequate attention. I scraped out the interior of the os calcis, as I thought very thoroughly, in a strumous abscess of the interior of that bone, and in doing so succeeded in rendering it aseptic. Four weeks thereafter, and before the wound had nearly healed, strumous arthritis of the wrist declared itself, and ultimately required excision. A boy of thirteen years was brought in with very extensive tuberculous ostitis of the left ulna, which had been going on for many months. He had no other lesion at the time. I removed a large exfoliation and scraped out the interior of the bone throughout nearly its entire length. Shortly after the operation, which was thoroughly successful locally, there appeared, one after the other, ostitis of the crest of the right ilium leading to carie-necrosis, necrosis of the right frontal bone, and antero-posterior curvature of the spine in the region of the second dorsal vertebra. I could multiply

such cases considerably, and even mention instances in which apparently successive showers of diseased material have been deposited from the circulation. These will serve, however, to illustrate the proposition that dissemination occurs after operation, especially in osseous tubercle, not only in the way of miliary tuberculosis, but also in a more limited manner, when the tubercle introduced into the circulation is probably less abundant, and chooses, as it originally did, a suitable soil for its development.

These considerations, then, must form an important element in the determination of the nature of the operation to be attempted, as regards total removal of disease. They are most serious in connection with arthrectomy, less so in excision, least in amputation. Such accidents, again, will plainly be most liable to occur when the disease is extensive, and one or other mode of operating will be, therefore, performed according to the extent of the disease. But they will, also, be prone to happen in proportion to the size of the wound, and especially of raw osseous surface, and in this respect the relative value of the operations varies in different cases, arthrectomy in some having the advantage. It is evident, therefore, that no hard and fast rule is to be laid down, and that in every case many factors must be carefully weighed, one against another, before the surgeon can decide upon the appropriate operation.

I have already said that in a young and comparatively healthy person with unbroken skin, the risks of amputation and excision are so small, and differ so little that preservation of the limb should be the rule. This proposition implies that age, health, and septicity, and to them I would add the social status, are factors of no mean importance in determining our choice. We incline to amputation in preference to excision more and more; the older a patient is the more his constitutional vigor has been impaired, or is naturally defective, the greater the damage sustained from putrefactive conditions, and the less the pecuniary and hygienic circumstances are capable of affording the means of a long struggle with disease.

These propositions are so palpable, and have so often been illustrated, that it is unnecessary to cite cases in their support.

But I feel convinced that, with increasing experience, the surgeon tends more and more to conserve the life rather than the limb, the limb rather than the joint. As each advance in surgical therapeutics diminishes the danger of conservatism, he draws his line back in accordance with the logical consequence of the improvement. Where the comparative risks differ but little he preserves, but the tendency with many is to extend a new improvement further than is legitimate, and it is well, in such circumstances, to draw attention to the conditions of the problem, and in this particular case to define, so far as may be, the reasonable limitations of arthrectomy as compared with excision and amputation.

REVIEWS.

LECTURES ON ECTOPIC PREGNANCY AND PELVIC HÆMATOCELE. By LAWSON TAIT, F.R.C.S. Edin. and Eng., LL.D., Professor of Gynecology in Queen's College, Birmingham; Surgeon to the Birmingham and Midland Hospital for Women, etc. 8vo. pp. 107. Birmingham, 1888.

CIRCUMSTANCES conspire to direct attention to this work out of all proportion to its size. The subject is one of the deepest interest from its intrinsic importance, from its recent rapid advance, from the open questions relating to it which yet remain unsettled, from the widely diverse views upon them held by men of equal ability and equal opportunities.

The author is well known as a bold and skilful operator, whose field of observation has been exceptionally wide, and who has advanced the lines of our knowledge. He is a man of decided opinions, as are most men who form them from observation, and he is in the habit of stating his views with a positiveness which permits of no doubt as to his meaning. It cannot be denied that he has also exhibited other characteristics which cause the productions of his pen to be scrutinized with interest. Certain altercations on this side the water need not be mentioned; in some of them Mr. Tait had great provocation. With positiveness of conviction and of statement he has manifested also the utmost scepticism as to the testimony of others and an intolerance of criticism unexpected in one who has done so much good work. Views which do not agree with his he greets with undisguised contempt, and if any one dissents from or opposes his doctrines he turns and rends him, and thus has developed bitter contentions on every hand. The subject-matter of this little work then invites a close examination while the characteristics of the author provoke it.

The title of the work, so far as "lectures" are concerned, is a misnomer. No address heads the opening, no statement is made as to when, where, or to whom was the delivery. There is no division in the text; the book begins without preface or introduction and continues unbroken to the end. The style is sometimes faulty; often short, sharp, and incisive; and Buffon said "the style is the man." Did space permit we should like to give some specimens, but will refer only to his treatment of the influence of the puerperal condition upon the result of operations [p. 24] and give the following for its practical as well as its illustrative value:

"Absolute accuracy of diagnosis in the abdomen [!] is very far from being possible; only the ignorant assert that it is, and only fools wait for it."

The book is eminently practical in character, as might be expected. It deals with the author's own observations and is based upon "post-mor-

tem examinations, museum specimens, and the facts observed at operations." The field has not been limited:

"I have now been concerned directly and indirectly in the post-mortem examination of twenty-six women who died from hemorrhage into the peritoneum from ruptured ectopic gestation. I have had to operate forty times for the same cause, and I have witnessed about ten similar operations by other surgeons, making in all the unique experience of seventy-six cases."

Looking through the contents we find a good deal here that is in the author's treatise on *Diseases of the Ovaries*, published in 1882. Indeed, many pages have been transferred literally. The largest amount of new matter relates to hæmatocele, its pathology and diagnosis, and an account of the cases of laparotomy for ruptured tubal pregnancy, an operation not yet performed when the treatise was published. Of these cases Mr. Tait has had no less than forty, and a list of them is here given with date and place of operation and name of medical attendant. so that all cavil is precluded. Of these forty operations for an overwhelming calamity and a most dangerous condition, all have been successful but two. This is a record of which the author may well be proud, and it is still more to his honor that he first executed this procedure which had been frequently suggested and even urged upon the profession but which no one before had been bold enough to undertake. This work of the author will be an enduring monument to his memory: it cannot be destroyed however bitter may be the controversies in which he engages. He may await quietly the verdict of time.

But we have to deal now with the book and its contents and to consider the manner of presentation of the subjects. We should like to give the author's views upon the pathology and classification of hæmatoceles, but must limit attention to extra-uterine pregnancy, and will follow the writer pretty closely through three subdivisions of the subject: the pathology; diagnosis, in the early stages only; and treatment.

The views of Mr. Tait as to the pathology of extrauterine pregnancy, or ectopic gestation, as he prefers to call it, have been before the profession for a number of years, having been presented in journals and in the treatise on ovarian diseases. The briefest statement of them is alone required here. His leading doctrine is that the error of location of the impregnated ovum is exclusively limited to the tube. Going on to the point of rupture the cases diverge into two classes according as the rupture occurs on the lower portion of the tube, and the effusion of blood and extrusion of the fœtus are between the layers of the broad ligament, thus extra-peritoneal; or as the rupture occurs in other portions of the tube and the discharge of contents is into the abdomen—intra-peritoneal. The latter is uniformly fatal, without operation for clearing out the abdomen, either by hemorrhage or by suppuration. The course of the former, the sous-peritoneo-pelvienne of Dezeimeris, may be very diverse. It may, *a*, develop to full time; *b*, may die and be absorbed; *c*, further along may die, suppurate, and be discharged *via* rectum, bladder, vagina, or umbilicus; *d*, may become a lithopædion; *e*, may become abdominal or intra-peritoneal by a secondary rupture of the tube. This scheme has the merit of clearness, of probability, and of simplicity. If true, it brings order out of confusion, and reduces to a very few the

numerous varieties of former writers, amounting sometimes to nearly a dozen.

Hoping, then, that other observers will corroborate and verify Mr. Tait's views of the pathology thus far given, there would be nothing to say had he stopped here. But in his denial of the existence of primary abdominal and of ovarian extra-uterine pregnancy, we have an exhibition of his methods and an illustration of his mental characteristics that cannot be passed by. It will have been seen in the scheme given, that an abdominal or intra-uterine gestation is admitted, but it is only as secondary to a rupture of the tube, the placenta having its attachment to that structure still. But a primary pregnancy in this locality, the ovum dropping into the peritoneal cavity and the placenta attaching itself to the viscera, he denies. As this variety has been recognized by all who have ever written on the subject, he should give his reasons for rejecting it, and this he does:

"That a fertilized ovum may drop into the cavity of the peritoneum and become developed there, is a contingency I cannot accept for a moment, for the powers of digestion of the peritoneum are so extraordinary that an ovum, even if fertilized, could have no chance of development."

But facts are stronger than beliefs or doctrines. There have been some cases in which the placenta was found attached to omentum and intestines. Thomas found a placenta attached to the colon from caput to the sigmoid flexure.[1] Maticki's case[2] is alluded to by the author, and Lecluyse's.[3] In the latter, the ovum escaped through an aperture left by the healing of the wound of a Cæsarean section. These cases he explains by a fine specimen of special pleading, but does not say anything of Kellar's case,[4] which occurred two years after amputation of the body and part of the neck of the uterus, and in which it would be difficult to believe in a tubal location. Still, it would not cause any difficulty to Mr. Tait; he reiterates that all these pregnancies are tubal, and tubal they must be:

"I do not see any difficulty in believing even that a pregnancy originally tubal may be completely extruded from the tube, that the tube may contract and heal, and that a secondary and wholly intra-peritoneal gestation may thus be formed."

This may be accepted as Mr. Tait's belief, but if Maticki's case sustains it, a full report of it should have been given, and if Dezeimeris has furnished any proof—his name is given in brackets in this connection—it should also have been given in full. Granting, however, all that is here claimed, what becomes, in the light of these cases, of the digestive powers of the peritoneum?

The ovarian variety of extra-uterine pregnancy is, undoubtedly, very rare. Stoltz and Depaul both denied it, and Mr. Tait is following in good company. He does not, however, absolutely deny this variety, being evidently staggered by the weight of Spiegelberg's authority. He says justly that "only at the hands of a competent observer could the assertion of an ovarian pregnancy be accepted," and the eminent German must surely be taken as such. But we have nothing to do with Mr. Tait's denial of, or scepticism in regard to, ovarian preg-

[1] Amer. System Gynecology, vol. ii.
[2] Monatschrift für Geburtshülfe, May, 1860.
[3] Bull. de l'Académie de Belgique, 1860.
[4] Spiegelberg, Lehrbuch der Geburtshülfe, p. 309, note.

nancy. The methods he takes to dispose of facts which stand in the way of his doctrine alone concern us. Puech's case is an admirable example.[1] The report says that on incising the cyst there was found "an embryo in the form of a vermiform body, 1 mm. long, curved in the middle and swollen at one extremity." Upon this we find the following, and much more like it:

"Of course, the whole conclusion in this case depends upon the assumption that this vermiform body was an embryo. It may have been one, but certainly there is no proof advanced in favor of this view. . . . I am not inclined to admit that this vermiform body has been shown conclusively to have been an embryo."

This is a short and easy way to dispose of the facts of a post-mortem examination, especially by one who was not present and did not see the specimens! What kind of proof does Mr. Tait want to establish anything which runs counter to his doctrines? An answer will be found in his comments on the case which Spiegelberg has reported [p. 10], and it will justify italics:

"As Spiegelberg *does not claim to have found ovarian elements all over the wall of the sac*, I think we may be quite justified in being somewhat sceptical even about this case."

Other instances, quite as flagrant, could be taken from the few pages [8–13] devoted to this subject. But we find no notice of the statement made by Spiegelberg,[2] that in ten cases the existence of ovarian pregnancy has been "positively proved;" nor that of Leopold, that fourteen cases have been "clearly established by anatomical proof."[3]

No portion of the subject of extra-uterine pregnancy is of more importance than diagnosis in the early stages. As giving opportunity for treatment before rupture of the sac it is of prime importance. To those who have read the author's papers upon this subject and his remarks in societies, it will not be surprising to find that he here expresses the greatest doubt as to the possibility of a diagnosis of this aberrant gestation before the period of rupture. This he does in several places [pp. 15, 16]:

"Much discussion has taken place of late years as to the possibility of diagnosing tubal pregnancy before the period of rupture, and many strangely dogmatic assertions have been made to the effect that such cases have been diagnosed and successfully treated. I am bound to say that I am exceedingly sceptical concerning the correctness of these statements."

This is not quite so categorical as his utterance at the British Medical Association meeting at Brighton, where he said, "There are no symptoms in tubal pregnancy before rupture is established."[4]

But there has been long recognized an assemblage of symptoms which point strongly to this pathological condition. We can go back to Bernutz and Goupil, authorities which Mr. Tait quotes frequently, and whose facts even, as well as doctrines, he accepts. They speak of an "ensemble of signs, no one of which is pathognomonic, but the reunion of which scarcely leaves a doubt."[5] Of course, an author who assumes

[1] No reference or date given.
[2] Op. cit., p. 308.
[3] Maygrier, Terminations et Traitément de la Grossesse Extra-uterine. Thèse. Bruxelles.
[4] Brit. Med. Journ., 1886, vol. ii p. 1094.
[5] Clinique sur les Maladies des Femmes, t. i. p. 567.

to teach his medical brethren will examine these signs and symptoms one by one. We certainly expect Mr. Tait to do so, because in an article on "Methods of Diagnosis,"[1] he says that "every method that is possible for a correct estimate of the nature of the disease should be exhausted before the abdomen is opened." We will see. The first point is a belief on the part of the patient that she is pregnant, or such general symptoms of this condition as lead the practitioner to believe that she is. This has been the case so frequently, that some writers have held its presence to be essential. Bernutz and Goupil say it was so with all their cases but four. Mr. Tait's experience, as recorded in these lectures, is singularly at variance with that of others. He says [p. 17] that "the great bulk of my patients had no suspicion that they were pregnant at all;" and that the whole history of such cases may be "misleading." This testimony will confirm that estimate of this feature to which it is alone justly entitled: if present, its evidence is strong, but its absence is of no great value. It is singular, however, to find on comparing the author with Mr. Tait, that in the report of the first five cases operated on by him for rupture of the tube,[2] that due consideration is there given to the history of the case; and "the diagnosis is not so very difficult after all, for in many cases the existence of pregnancy has been suspected before the rupture occurs."

The next feature of extra-uterine pregnancy is disordered menstruation; this flow is either absent, or irregular, or continuous. Mr. Tait says:

> "Menstruation is sometimes suspended absolutely, as in normal pregnancy, but more usually it occurs irregularly and profusely, so that here again we are misled."

And this is all he says upon this point! Menstruation is not mentioned again. It would have been most satisfactory to know how we are "misled," by this symptom, which ought at once to waken suspicion and direct attention, but the author does not tell us.

It will scarcely be believed that these points in the early diagnosis are all that are considered in these lectures. We would not dare to make such an assertion if we had not the book to produce. But here there is no mention of attacks of severe abdominal pain, no statement that the decidua is sometimes thrown off, and that this occurrence is by very respectable authority held to be pathognomonic. There are no directions, when these symptoms present themselves, to proceed to a vaginal examination. Nothing is said of what is likely to be found upon making such examination, not a word as to a tumor present displacing the uterus; no description of certain signs which have always been found in such cases, no statement of their relative value or estimate of their worth in making a differential diagnosis. In this, his latest production, Mr. Tait is behind himself. He is behind his treatise on *Diseases of the Ovaries*, in which he says [p. 83] that in extra-uterine pregnancy there is a tumor intimately associated with the uterus, which is always enlarged, and that a cervix quite open is "the most important point." And this statement he reiterated in a debate before the London Obstetrical Society.[3]

[1] Amer. Journ. Obstet., April, 1866.
[2] Brit. Med. Journ., June 28, 1884, p. 1250.
[3] Amer. Journ. Med. Sci., July, 1873, p. 278.

If Mr. Tait does not consider the symptoms of diagnosis *seriatim*, as it is seen he does not, surely he states them in gross. We find the following:

"The diagnosis of tubal pregnancy before rupture of the tube is not easy, as I have said, because the patients do not claim our attention. What symptoms there are, as in the solitary case where I had a chance of making a diagnosis, *are merely those of tubal occlusion and distention*—matters very easy to diagnose and to treat"—p. 24.

Italics are supplied to part of this quotation, because it is marvellous that Mr. Tait should ignore the fact that there are peculiar features of this tumor which, he has said formerly, is attached to the uterus, features which belong to no other cyst or inflammatory effusion ever found there. It is not possible that he does not know that in very many of these cases there is a vascular pulsation felt in the walls of this enlargement. This was pointed out as a feature of extra-uterine pregnancy by Baudelocque. We cannot believe that he does not know that many observers have reported that this tumor increases rapidly in size. Is there any occlusion and distention of the tube that grows so rapidly that its increase can be noted from week to week? Upon this point of marked difference between a gestation cyst and other tumors of the pelvis the evidence is overwhelmingly against the author, simply from the number of witnesses. Had one individual, even with as great experience as Mr. Tait, described these peculiarities of the cyst, his evidence might be impeached. But the facts rest upon the observation of many different individuals; of men who had no thought in mind of extra-uterine gestation, but who were struck with the fact that what they had under touch was different from anything they had ever met with before, and who were forced into an unexpected old theme—a novel diagnosis.

In the matter of diagnosis of this condition after the death of the child these lectures are full, explicit, and satisfactory [pp. 59-70]. What explanation can there be, then, for so meagre a consideration of diagnosis in the early stages? Mr. Tait has never been called upon to make an examination before rupture but once. This, he says, is "the most singular thing of all," and it certainly is. But is there any warrant in this fact for doubting that no one else has made or can make a diagnosis of extra-uterine pregnancy because he has not had the opportunity of doing so? In this country the diagnosis has been made repeatedly and by so many different men that it would be invidious to mention individuals. A single paper contains a record of four;[1] and many cases could be adduced in which an operation or a post-mortem examination verified the diagnosis. Winckel, in Germany, has made a diagnosis in thirteen cases, in six of which it was verified afterward.[2] From the treatment which we have seen that Mr. Tait accords to facts observed by others, we could not expect him to receive these reports. If he will not accept those presented before him, he would not listen to these. At the Brighton meeting of the British Medical Association, Dr. Berry Hart, an authority that Mr. Tait quotes approvingly, reported a case in which diagnosis was made before any symptoms of rupture occurred. Mr. Tait was present at that meeting and then made the statement, already quoted, that "there were no symptoms in extra-uterine pregnancy until rupture was established."[3]

[1] Dr. Janvrin's paper, N. Y. Med Journ., April 28, 1888.
[2] Lehrbuch des Geburtshülfe, 1889.
[3] Brit. Med. Journ., Dec. 4, 1886.

From a careful study of all the recorded cases of extra-uterine pregnancy the conclusion cannot be escaped, that while exceptional cases present insuperable difficulties of diagnosis, as a general rule, a concurrence of symptoms announces emphatically the probability of this condition, and by a physical examination its existence is established, and that with greater ease and certainty than in normal pregnancy at the same period. This has been maintained by high authority in this country, and in Great Britain and in Europe. Is it expecting too much of one who appears before us as a teacher, that he should have given every point for investigation, or that he should help his brethren in the matter of diagnosis rather than discourage them?

In considering the treatment of this most dreadful and heretofore most fatal calamity that can overtake woman, no one can fail to rejoice at the progress which has been made. An accident so long considered as hopeless by the best minds of the profession is at last yielding to the therapeutic agents and the bold surgery of our times. Treatment of extra-uterine pregnancy after rupture of the sac is plain. Suggested by several, urged by some, it remained for Mr. Tait to put it into execution, and his record of thirty-seven cases saved out of thirty-nine is one of the most brilliant triumphs of modern surgery. We have only here to comment upon one point, which is historical. Mr. Tait does not attempt a full history of the procedure, but he gives enough to justify the demand that he should give more, and with due regard to the honor of this country we can let no account pass unchallenged that does not contain some mention of the work of Stephen Rogers. From Blundell, in 1830, Harbert, in 1849,[1] and to Kiwisch, in 1857, and Tanner and Tyler Smith, and Bernutz and Goupil, laparotomy for this condition was hinted at or faintly suggested. But no one formulated the doctrine, emphasized its importance, and boldly urged it upon the attention of the profession until Stephen Rogers did so before the American Medical Association.[2] He first clearly taught the doctrine which Mr. Tait has carried into execution, and it is with regret that we do not find here any mention of his contribution to the subject. Still more do we regret to find one of our countrymen making the same omission. Three pages upon this portion of the subject are quoted from an American writer. The "mention" of Blundell, and the "suggestion" of Bernutz are given by this writer, with the "realization" of Mr. Tait, but not a word, not even the name of Stephen Rogers, the man who, as early as 1867, wrote these words:

"The first thing in order is the prevention of any further loss of blood; to accomplish which there is no choice of methods: *the peritoneal cavity must be opened; the bleeding vessels must be ligated.* . . . As gastrotomy is the only hope, gastrotomy must be performed."[3]

As space could not be found in this little work for these few lines, while three pages of laudation of the author by this writer are admitted, it looks very much as if fealty to Mr. Tait, rather than scientific value, was the criterion of quotation from American writers.

On the treatment of the sac before rupture, of course there is nothing to be found here, as the author has never made a diagnosis. Should he meet with a case he would "advise its immediate removal by abdominal section." He does not mention Veit's two cases,[4] in one of which a

[1] Parry, op. cit., p. 212. [2] Transactions, 1867. [3] Op. cit., pp. 117, 118.
[4] Maygrier's Thesis. Zeitschrift fur Geb. u. Gyn., 1885, B. xi.

diagnosis was made before operation, nor Price's case in this country, also with a diagnosis.[1] Nor does he anywhere enter upon the technique of the operation; an omission which is to be regretted. These lines alone contain all that is said of the method of operating:

"The true method of operating is to separate adhesions rapidly regardless of bleeding, and make at once for the source of the hemorrhage, the broad ligament, tie it at its base, and then remove the ovum, débris, and clots at leisure."

But there is another mode of dealing with an extra-uterine pregnancy before rupture which has proved efficient in, for so new a measure, quite a good number of cases, and a method whereby the patient escapes the dangers of a severe operation. We allude, of course, to electricity, and it remains to be seen what the author of these lectures has to say of this. He would perform laparotomy in a case when diagnosis had been made before rupture,

"as being more certain and far more safe than the fancy methods of puncturing the cyst and injecting poisonous fluids, or passing through it some kind of galvanic current" [pp. 24, 25].

In another place [p. 53], he speaks of the treatment by electrolysis as "mere nonsense." Again [pp. 70, 71], he considers the "various forms of treatment designed to obviate the necessity for surgical operations;" and says of "puncturing the ovum sac with needles medicated or galvanic," as an "immoral and dangerous proceeding." On page 50 he speaks of "curing the cases by a puncture either simple, medicated, or electrolytic." Further,

"The surgical principles on which the operation is to be conducted are now so well established, and *its results are so good*, that the opponents of the operation seem to me to be in a very illogical position if they still continue to advocate certain other surgical proceedings *of which the results are notoriously bad*" [p. 70].

Mr. Tait appears before us as a teacher; as a teacher of a scientific subject. In an open debate upon any subject it is held essential to honor that the position of opponents shall be fairly stated, and whatever facts they present be treated with justice. In science all facts must be stated, examined, and duly considered; and science tolerates no contemptuous epithets. Now, as to fairness, Mr. Tait has here mixed together the methods of puncturing the cyst with needles for electrolysis, of injecting certain fluids to kill the fœtus, and has failed to differentiate or speak of the treatment by the faradic or galvanic current without puncture. Moreover, he details [p. 75] a case of Matthews Duncan's in which galvanism was first used, then two grains of morphia were injected into the sac, then the amniotic liquor was drawn off, then a quarter of a grain of morphia was injected into the body of the fœtus and repeated, then galvano-puncture was resorted to, and again morphia injected into the body. And this case Mr. Tait presents as a specimen of the "application of electricity for the treatment of ectopic gestation."

Now, to return to the quotation last made, in which we have italicized some portions. What is the operation which Mr. Tait contrasts with the application of electricity? Not laparotomy for ruptured sac; elec-

[1] Annals of Gyn., March, 1888.

tricity has never been advocated for such cases. Its advocates apply it only in the early stages to the unruptured sac to kill the fœtus, stop growth, and save the patient the perils of laparotomy. An operation in competition with this would be extirpation of the sac before rupture. Mr. Tait has not performed this operation; it has been performed but a few times in all. How, then, can it be said that "the results are so good"? Is it possible that Mr. Tait, a teacher, can contrast an operation for a certain stage of the disease with measures of relief adapted only to another stage?

What are the results that are "so notoriously bad?" The author is speaking of all measures designed to save the patient from laparotomy. We will not champion the cause of injecting the sac with morphia, but the results obtained by Winckel, as reported at the last meeting of the German Gynecological Society,[1] will serve to show that a final decision has not yet been reached even as to this measure. Still speaking of these procedures, Mr. Tait says—

"There can be, there clearly is, *from the statements of those who have tried these plans, neither certainty nor safety about them*" [p. 25].

The treatment of extra-uterine pregnancy by the faradic or galvanic current is one of these plans, and the above is so extraordinary that we italicize it. Where are the statements? Certainly they should have been given, and doubtless would have been had there been any to give. As to the certainty and safety of this mode of treatment, surely Mr. Tait, as a teacher, keeping up with a subject to which he has contributed so much, should know something of the cases in this country reported as cured by electricity. They surely deserve respectful mention. One well-marked case is reported by a gentleman who has published an experience nearly one-half as large as that of the author himself, large as it is. One volume of the transactions of a society, of which Mr. Tait is an honorary member, as long ago as 1882 contains no less than seven of these cases.[2] In 1886, it was published that one man had had no less than eleven successful cases.[3] These cases certainly demand some sort of notice from a gentleman who delivers a course of lectures upon the subject.[4] It would be useless to refer Mr. Tait to these cases, or to such clear and decisive ones as those of Thomas,[5] Garrigues,[6] and Lusk.[7] Useless because we can see how he treats them nearer home. At the meeting of the British Medical Association, at Brighton, Dr. Aveling read his case, already alluded to under diagnosis, and it was a clear and well-marked cure by electricity. Dr. Gardner, of Montreal, also presented one in which after the sixth application of the current "the sac suddenly shrank and pulsation ceased." Whereupon Mr. Tait arose and characterized the use of electricity for the cure of extra-uterine pregnancy as "one of the most nonsensical proposals which had ever been submitted to a surgical audience." By certain expressions here and there through the book, Mr. Tait shows that he chafes under strictures upon his proneness to resort to laparotomy. Does he not deserve more than he has yet received, if in advocacy of operative procedure he

[1] Verhandlungen, p. 82, 1888.
[2] Amer. Gyn. Soc. Papers by Garrigues and Thomas.
[3] Same, p. 474, 1886.
[4] The latest reports give 39 successful cases treated by faradism or galvanism without puncture. Hawley, N. Y. Med. Journ., June 18, 1888, and Brothers, Amer. Journ. Obst., May, 1888.
[5] Case IV, Trans. Amer. Gyn. Soc., vol. ix. p. 176.
[6] Ibid., vol. vii. p. 185.
[7] Amer. Journ. Obst., p. 329, 1881.

ignores results obtained over and over again by less dangerous methods? When he not only ignores facts reported by competent observers, but turns them aside with the sneer of "nonsense?" It is folly for him to attempt to deny the reports. The men making them stand too high and they are too numerous. As with diagnosis, one individual upon this point may be mistaken or biassed, however large his experience. But here are a score of observers who have found a cyst in the pelvis, rapidly growing, actively pulsating, and, after a few applications of the current, observed it shrink, cease to pulsate, and begin to disappear, while the patient suddenly lost all symptoms which were before well marked.

Mr. Tait, having characterized the treatment by electricity as "nonsense," makes two formal objections to it. The first is that it is "immoral." It is immoral to kill the fœtus, albeit yet only twelve or sixteen weeks advanced, and out of the receptacle which it usually occupies, in order to rescue the mother from the gravest peril, and to do this puts "legitimate practitioners of medicine quite on a level with abortion-mongers and reckless craniotomists!" In support of his position he adduces two cases. The first is Dr. Aveling's; the second, one by Dr. Buckmaster.[1] Both of these patients, besides presenting the other symptoms of extra-uterine pregnancy, had suffered attacks of severe hypogastric pain with symptoms of collapse. Yet Mr. Tait maintains that there was nothing calling for interference. "Beyond the fact that an ectopic gestation was diagnosed, there was no reason apparent for interfering." Of the other, he says: "The patient was suffering from nothing but slight discomfort, and the unfortunate fact that Dr. Buckmaster had diagnosed an ectopic gestation." Now the author plainly teaches the doctrine, and it needs impressing upon the profession at large, that these attacks of severe pain are hemorrhages, or partial ruptures of the cyst, and that several such attacks may occur before the final fatal one. That there may be no mistake about this we quote. On page 19, after giving a graphic description of an overwhelming case, we read:

"Sometimes the symptoms abate, the patient recovers for a few days and even gets about, then a recurrence of the peritoneal hemorrhage occasions a revival of the serious symptoms, and this may be repeated at intervals several times before the fatal issue is arrived at."

Again: "In very many of these cases a feature of great interest is the fact that the first attack of hemorrhage is generally not fatal, and that the records yield incontestable evidence that it may require the repeated occurrence of bleeding to bring about the fatal issue" [p. 38].

So Mr. Tait boldly assumes that the final rupture had taken place in these cases; that fœtuses of about twelve and sixteen weeks were so sure to become viable that it was "immoral" to destroy them, and relegates Drs. Aveling and Buckmaster to the company of "abortion-mongers" for having acted upon the note of warning that he himself sounds.

The second objection made by the author to electricity is that, the fœtus being killed, the placenta will continue to grow and cause trouble. This is supported by a series of pathological examples in which the size of the placenta did not correspond with that of the fœtus. But, surely, to make this plea good, it should be founded upon clinical evidence. Some one of the thirty-nine cases thus treated should by this time have given evidence on the point. No such example can be adduced. But

[1] Medical News, July 21, 1888.

Mr. Tait presents one case to sustain his point, and it must not be omitted because it so well illustrates his peculiar methods of dealing with evidence. He gives a case, p. 74, from Hart and Barbour, in which, "*after a puncture of the cyst with an aspirator needle*, the patient died with symptoms of internal hemorrhage;" and then says, "the continued growth of the placenta after the fœtus had died had led to fatal hemorrhage." Mr. Tait has evidently forgotten the physiological law that an organ whose function has ceased atrophies, and, moreover, in his treatment of extra-uterine gestation arrived at term, he manifests no fear of this continued growth of the placenta, but closes the wound over it, awaiting a more favorable time in the future for its removal.

Finally, is there any connection between the hostility to electricity manifested by the author and his doubts as to the possibility of an early diagnosis? The query is forced upon us because the course he pursues upon these two subjects is exactly similar to that followed in this country by those who advocate laparotomy as the only treatment of extra-uterine gestation. Doubts have been so openly and frequently expressed as to the correctness of diagnosis that those who have reported but a single case feel that they would never do the like again. Yet these doubters would surely accept a diagnosis of pleuritic effusion, when made by *cliniciens*, and not meet it with the suggestion that the symptoms having disappeared, the liquid itself not being presented, there was no effusion after all!

These lectures were evidently not intended for pupils, for the most elementary instruction upon the subject, as diagnosis, is omitted; they cannot be intended for the profession, for they do not contain a full account of the subject. As a contribution from Mr. Tait, setting forth his operative work, the book contains some valuable material, and some new and probably true views of pathology. As a scientific treatise we are compelled to say that it is not worthy of the name. The false logic it contains, the numerous instances of special pleading and of begging the question, the bald assumptions, the coolness with which the reader is informed that the reporter of a case did not see what he says he saw, render it a book *sui generis*. The whole range of medical literature may be searched in vain for its equal. J. C. R.

A Clinical Atlas of Skin and Venereal Disease, including Diagnosis, Prognosis, and Treatment. By Robert W. Taylor, A.M., M.D., Surgeon to Charity Hospital, New York, etc. Illustrated with one hundred and ninety-two figures, many of them life-size, and fifty-eight beautifully colored plates; also many large and carefully executed engravings through the text. Part III., Venereal Diseases, and Part IV., Diseases of the Skin. Philadelphia: Lea Brothers & Co., 1888.

The third and fourth parts of Dr. Taylor's admirable atlas are, in all respects, equal to those which have been already given to the professional public. The colored plates, new and old, are admirable representations of the pictures presented upon the surface of the skin in the several diseases chosen for illustration. Some of the old (*e. g.*, Plate XXIII. Fig.

2, representing a papular syphiloderm in groups about a child's mouth) are better in the reproduction than in the original; while others (*e.g.*, Plate XXVII. Fig. 1, portraying a moist eczema of a child's face and scalp) appear to better advantage when somewhat reduced in size, than when printed in their former dimensions, corresponding to the larger figures of the Sydenham Society's sheets; a few were inferior in execution when first published, and have naturally gained nothing in the reproduction, a defect, however, due to the artists who first undertook the onerous task of reproducing the multiform shades of a cutaneous exanthem in their original colors. The portrait of erythematous eczema of the face (Plate XXII. Fig. 1) is decidedly less faithful than another representing the same affection of the same region which first saw the light on this side of the Atlantic, but which was unfortunately not at the disposal of our author, in consequence of the destruction of the original plate.

Viewing this collection as a whole, it may be said of these, as of those which have been already published and received notice in these pages, that it is difficult to overestimate their clinical value to the practitioner and diagnostician. It is not always the larger and more highly colored pictures of any collection that are most prized by the connoisseur. A careful study of even the smallest of these portraits of disease will well repay the student. Their practical value in teaching is exactly proportioned to their faithfulness to fact. Said the distinguished French artist, Jacques Louis David: "I wish that my works might be so completely antique in character that, if it were possible for an Athenian to return to life, they might appear to him to be the productions of a Greek painter." It may be said of many of even the smallest of these portraits, that if it were possible for the great clinicians of the last century to return to life, they would see nothing unfamiliar in these accurate representations of the phenomena of disease with which in their experience a hundred years gone they had become acquainted.

For example, in Plate XXIII. Fig. 4, one sees the portrait of a child's mouth, little more. The face is almost a monochromatic impression. The eyes are properly closed; there is almost no detail in the drawing of brow, cheek, and chin. There is a trifling and non-accentuated lesion visible near the ala of the right nostril, quite inconspicuous, because it lies almost in the shadow cast upon the cheek by the nose. The lips are not highly colored; they furnish merely the faintest suggestion of the color visible in a child asleep and not in sound health. Twelve, possibly more, shallow furrows, however, traverse their substance at somewhat irregular intervals, and almost symmetrically, running from the outer muco-cutaneous border to the inner line of the lips, at right angles in general to the cleft of the mouth.

Here is a picture, and a small one too, upon which the eye of the careless will scarcely linger. And yet it is precisely the visual impressions of this kind which the practised eye never fails to fix. Often, indeed, has an expert found himself before a white-faced and anxious mother, wearing a dark dress, her baby's cheek pressed against its "waist," the infant's face partly turned toward her breast so as to throw a light shadow on its features, when these delicate little furrows have in a single glance set him on the straight road to an accurate diagnosis, concluding with that of the misinterpreted chancre of a father before marriage. It was the fly on the nose of one of his portraits that gained for Holbein his superb reputation in Basle.

The text accompanying an atlas of plates is often merely a running commentary, apt also to be loosely written, on the illustrations furnished, the plan adopted when the late Mr. Charles Dickens was first engaged to furnish the text of the *Pickwick Papers*—merely to set the scenery for the genius of an English caricaturist. The text, however, of Dr. Taylor's atlas often bears such a relation to his colored portraits of disease as Mr. Dickens's famous pages bore to the work of the unfortunate English artist, who only survived the first two numbers of the serial that made the literary reputation of the man that was to act as his subordinate. In the work before us there is a careful and accurate exposition of the subjects connected with each disease selected for illustration, the arrangement being made to conform, as far as possible, to the classification adopted by the American Dermatological Association. The space allotted to definition and explanation of the elementary and consecutive lesions of the skin, is as ample and satisfactory as that given in any treatise on dermatology. In the important matters of etiology and treatment, the author is as lucid and practical as might be anticipated from one of his experience and previous contributions to dermatological literature.

Among the questions suggested for consideration in the International Congress of Dermatology and Syphilography, to be held in Paris during the current year, the following are propounded respecting the group, "lichen:"

"I. Should we, in accordance with the older writers on dermatology, still apply the word, 'lichen' to a number of disorders which modern writers on cutaneous disease regard as different from each other?"

"II. (In the negative.) (A) What affections should be set apart from this group and distinguished by some other name? (B) Assuming that a new group of 'lichenous' affections should be thus defined, what species, forms, or varieties should be here recognized?"

All this is very Gallican, one must admit, and it is interesting to see what our latest author has to offer on this point. It is, in point of fact, as satisfactory as the utterances on the same subject, of most exponents of the much derided and yet positive "American school." Dr. Taylor knows no lichen save lichen planus, lichen ruber, and lichen scrofulosorum; and merely gives to lichen pilaris, or, as it is sometimes called, keratosis pilaris, the consideration which that sufficiently simple disorder, almost physiological for many persons, deserves in the way of reference. All this is in the line of simplification, all in the line of clearing up that amplified mist of words and nonsense which somehow has enwrapped so large a part of this interesting subject. Turning to a late writer on the other side of the Atlantic,[1] we find him practically repeating the doctrines of the English school as they were first enunciated by the late Sir Erasmus Wilson, one of the most learned scholars of English authorship, but one who unwittingly contributed more to the reproaches of our dermatological nomenclature than any of his contemporaries or successors.

Dr. Taylor does not hesitate to advise the internal administration of arsenic in properly selected cases of chronic squamous eczema, and doubtless bases his counsel in this instance upon a more favorable experience than has been reported by others. As one observes with more constant diligence the course of these obstinate forms of inflam-

[1] W. Allan Jamieson, Diseases of the Skin, Edinburgh, 1888.

mation of the skin, he becomes gradually conscious that they change from better to worse and the reverse, with almost every thermal variation from one atmospheric temperature to another; and he may therefore be pardoned for exhibiting some scepticism when it is urged that an improvement after the administration of a medicinal dose of a poison, has been due to that cause alone. In discussing, further, the treatment and etiology of the genital eczemas of the diabetic, our author properly indicates the fact that decomposition of a saccharine urine in the affected parts may be productive of the disease. This is mainly the view of certain French writers who teach that there is a class of disorders known as *diabétides génitales*. It can, however, be certainly demonstrated in a proportion of these cases, that the sugar appears in the urine only after the local eczema has existed for an appreciable time, and that the latter is probably the efficient cause of the first named condition, seeing that in many of these cases as the eczema is relieved the sugar disappears from the urine, either never to return, or to return only with a repetition of the local accidents.

Dr. Taylor's atlas is to be warmly commended to the expert, the general practitioner, and the student, as an invaluable aid in acquiring a knowledge of the subjects illustrated, combining in a high degree the advantages of a sound text-book, with the special assistance of colored illustrations. The work of the publishers is in all respects satisfactory.

J. N. H.

Ueber das Verhalten der Tuberkelbacillen im thierischen Organismus unter dem Einfluss entwickelungshemmender Stoffe. Von Dr. Georg Cornet, pract. Arzt in Berlin und Reichenhall. *Zeitschrift für Hygiene*, v. pp. 98–133.

On the Behavior of Tubercle Bacilli in the Animal Body under the Influence of Substances which Hinder the Development of Microörganisms. By Dr. George Cornet.

Volkmann has aptly said: Man is no test-tube. Certainly nothing appears to have been more clearly proven than that no conclusions as to the therapeutic value of a drug can be inferred from a consideration of its germicidal power outside the body. Corrosive sublimate, the most powerful germicide known to us, is incapable of exerting any such action in the tissues of the living body, even though introduced in very large amount. While, therefore, a knowledge of the action of germicides upon pure cultures of pathogenic microörganisms is of great service in directing the channel of therapeutic research, it can do but little more, and we must resort to experiments on animals for any really valuable suggestions in aid of clinical experience.

In pursuance of this idea Cornet has attempted the determination of the action upon animals inoculated with tuberculosis of eight germicides, most of which have been reported of value in the treatment of phthisis. Tannin, acetate of lead, "pinguin," sulphuretted hydrogen, menthol, acid corrosive sublimate, creolin, and creasote were employed in the experiments. At their conclusion, not one of these could be

proven to have influenced the progress of the tubercular disease in a single case, although all were exhibited in maximal doses; indeed, many of the animals either died from the effects of the drug, or showed marked symptoms of poisoning.

A single case will serve as an example of the others. Acid corrosive sublimate was introduced into guinea-pigs in very large doses, the size of which can be better appreciated if we picture to ourselves the magnitude of proportional doses for man. Considered in this way, 25 c. c. to 250 c. c. of a 1 in 1000 solution of the sublimate were employed daily, but without any appreciable effect upon the progress of the disease. He would certainly be a bold therapeutist who would inject a half a pint of 1 : 1000 corrosive sublimate solution daily in the hope of obtaining such a saturation of his patient with the drug that he should be unfit ground for the existence of the germs already within him.

Before we can hope to introduce any very rational therapeutics in the majority of the infectious diseases, a more exact knowledge of the fate of pathogenic microörganisms in the body is necessary. As a result of the large amount of work which has recently been done in the endeavor to solve this problem, we can say little more than that in some way or other the tissues seem to be able to dispose of a certain number of microörganisms, and that there exists a certain relationship between the general vigor of the individual and his ability to dispose of them.

From these considerations the inexpediency of attempting any germicidal plan of treatment for tuberculosis must be apparent. It can only be weakening to the patient to introduce a large amount of poisonous material into the system, since this increases the amount of extraneous material which must be cared for by the tissues.

A knowledge of the fact that in certain parts of Austria, where much garlic is eaten, the proportion of phthisical persons is very small, has led Cornet to try the effect upon tuberculous animals of an infusion of the herb, but with the same negative result as in the other cases. The effect of high altitude (4800 feet) was also tried, but here again no positive result was obtained and Cornet was obliged to conclude that there is nothing in high altitude *per se* unfavorable to the progress of tubercular disease already established. J. S. E.

La Mort par la Décapitation. Par le Dr. Paul Loye, Préparateur du Laboratoire de Physiologie de la Sorbonne; Préparateur du Cours de Médecine légale à la Faculté de Médecine. Préface de M. le Dr. P Brouardel, Professeur de Médecine légale et Doyen de la Faculté de Médecine de Paris. 8vo. pp. x.. 285. Paris: Bureaux du Progrès Médical, 1888.

Death by Decapitation. By Dr. Paul Loye.

In the introduction to this volume, the author states that in view of the numerous discussions upon the subject of decapitation in the learned societies and in the press, and in view of the propositions looking to a change in the mode of punishment actually employed in France, he has

thought the opportunity favorable for collecting together all the facts, and for examining the value of the various opinions on this subject.

Dr. Loye has rigidly excluded everything that pertains to sentimentality and the right which society exercises of depriving a human being of his life, and has confined himself exclusively to the scientific consideration of the question whether consciousness survives decapitation, or whether intellectual death is really instantaneous. In order to determine this question, he has witnessed the execution of criminals and noted carefully every manifestation which succeeds the separation of the head from the body, and having been instructed on this point, he has endeavored to find in the laboratory an explanation of the facts observed, in order to determine their physiological value. He has demonstrated that, if by means of anæsthesia an animal is deprived of consciousness before decapitation, the contractions of the face, the grimaces which seem to indicate profound suffering, produce themselves with the same regularity and physiognomy. From this it is inferred that these appearances are unconscious, automatic acts. The facts which the author has collated and commented upon are numerous and scientifically precise. The conclusion arrived at will relieve society of the charge of inflicting upon the criminal a torture as horrible as that for which he is punished.

The first part of the work is devoted to an historical survey of the subject. Part second relates to experimental researches, whilst part third treats of death by decapitation in man.

After stating the medico-legal applications of the study, the author sums up his conclusions of a physiological, medico-legal, and moral and social order, substantially as follows:

1st. After decapitation, there is an absolute immobility of the body and an equally absolute immobility of the head, except in some cases where certain movements follow the initial calm. Death is calm, notwithstanding the presence of asphyxia (hemorrhage with arrest of respiratory movements), which would be supposed to excite convulsive movements. But under the influence of active irritation of the nervous system by the blade, or violent shock, there is a suspension, an immediate abolition of reflex and automatic action of the nervous centres. The excitability of the centres has disappeared; the peripheric irritations yield no response; and the asphyxiated blood can no longer exercise its convulsive effects. There can be no agony, no movements, no convulsions; death is calm, and both the head and the body remain immobile. This calm death, without agony, is caused by inhibition, which masks the effects of hemorrhage and asphyxia.

The effects of inhibition may be permanent, or only transitory. In the first case, the centres are definitively shocked, and death overtakes them in the midst of their insensibility. In the second case, the properties of the centres are only momentarily suspended; they may reappear in the course of time. But, in order for them to regain their activity, the centres must have preserved the conditions of their nourishment, they must have received the blood which is necessary to their support. If, during inhibition of the nervous centres, the blood has completely disappeared, their return to activity is evidently impossible. This is the state of the medullary centres of the decapitated trunk. If, on the contrary, during the state of insensibility they have retained a certain quantity of blood, they may recover some activity until the moment when the blood becomes in quality improper and insufficient. This is probably

what takes place in the case of the encephalic centres, when, in the decapitated head, they manifest some signs of excitability after an inhibition of one or two minutes.

2d. These researches are of some value in medico-legal inquiries. They assist in determining the conditions of deaths of certain victims after section of the soft parts of the neck, and even after the spinal cord has been severed. In the former case, death has probably occurred from asphyxia; in the latter, by inhibition. They demonstrate, further, that great reserve should be maintained in selecting the sign which serves to mark the moment of death. The heart of the decapitated sometimes does not cease to beat until one hour after decollation. From a legal point of view, it seems strange to regard the corpse separated from the head as living all this time. The arrest of the heart should not then be considered as the termination of life.

3d. It has been shown that after decapitation intellectual death, the loss of consciousness, is immediate and final. It is of no consequence whether the heart continues to beat, the nerves remain excitable, the contraction of certain muscles produces movements more or less disordered; if the mental functions are abolished, if the return of consciousness is impossible, the other manifestations of life should neither interest nor disturb the criminalist or moralist. There can be no doubt that the punishment is painless.

Of the modes of punishment employed by different people, the proof is incontestable that the one by decapitation is that which presents in the highest degree the guarantees of the immediate destruction of mental life and the impossibility of return of conscious activity. This cannot be said of other forms of capital punishment. For this reason search has been made for an ideal form of punishment capable of suddenly and definitively destroying life. Most naturally, attention has been turned to electricity as a means of accomplishing the desired end. Public opinion has inclined toward the substitution of *fulguration* for the guillotine. But our knowledge of the mechanism of death by electricity is still imperfect, and for this reason we are not justified in substituting it for a mode of punishment well known and definite in its application and effects. Death by it cannot be produced more rapidly or more surely than by decapitation. It is by its inhibitory action on the nervous system that electricity causes death; but decapitation possesses this influence in the highest degree. Decapitation has this advantage, that by relieving the nervous centres of the necessary blood, their restoration to activity becomes impossible; while after fulguration it is possible for consciousness to return. The only advantage of electricity over decapitation is, that it leaves the body intact.

There is another point to be considered; it is, that the separation of the head from the body offers a public proof of certain death; while in the other methods, especially in fulguration, simulation of death may occur. The only suffering connected with the mode by decapitation is moral agony which the fear of death may cause.

We have endeavored to sketch, as briefly as possible, the principal contents of Dr. Loye's interesting work. The subject is one of particular interest at the present time in France, and, in some of its bearings, has elicited discussion on this side of the Atlantic. The physiological features of the study are of special interest to the medical profession. The historical account of the subject is complete and full of interest.

The views of different writers are carefully presented and commented on. The results of the author's observations and experiments, and those of other investigators, are clearly described. Though the subject suggests the sensational, the investigation has been confined strictly within scientific bounds. The results obtained, besides advancing our knowledge of certain questions in human physiology, will help to relieve society of unnecessary disquietude, and enlighten popular opinion upon a subject concerning which there has been more or less misinformation.

W. H. F.

THE MOVEMENTS OF RESPIRATION. By MAX MARCHWALD, M.D. With an INTRODUCTORY NOTE by J. G. M'KENDRICK, M.D., LL.D. 8vo. pp. 171. London: Blackie & Son, 1888.

So seldom is it that a monograph originally published in German upon a physiological subject is reproduced in English that the book before us is a treat to those who wish to get an insight into foreign original research without taking the time to labor through an entire work in a foreign tongue.

The book before us is devoted not so much to the movements of respiration as to the respiratory innervation, and the author has, in conjunction with Hugo Kronecker, of Bern, certainly reached very instructive results from interesting studies. It is impossible in this short notice to give the results even as briefly as Marchwald sums them up at the end of the work. He supports the theory that the automatically acting respiratory centres send out impulses which if ungoverned produce simply incoördinated respiratory movements, and believes that the vagus nerve is endowed with the function of regulating these impulses, coördinating them and so directing them as to fully utilize them. The impulses, in other words, are sent out by the centre spasmodically and not rhythmically.

The book is wonderfully well illustrated by tracings and its value is greatly enhanced by their clearness and careful execution. One cannot help feeling surprised that a work so purely physiological should be republished, particularly in view of the labor of translation. The interest of Dr. M'Kendrick in such subjects undoubtedly is responsible for the effort made to give English readers a high-class original treatise, and we sincerely hope that all interested in nervous mechanisms, even elsewhere than that of respiration, may show their appreciation of the work. Many lines of original research open themselves after a perusal of its pages and questions of vital interest are answered with clearness and exactitude.

H. A. H.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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Strophanthus.

The number of articles which have appeared about strophanthus during the past year and a half is very large; notwithstanding such testimony to the great interest taken in this drug by both physiologists and clinicians its action and best application are still open to much question.

The sources and species of strophanthus are many: Fraser experimented with strophanthus kombé; others with strophanthus glabre, strophanthus sarmenteux, or some other variety. Besides this botanical confusion there are commercial frauds, such as the substitution of the Indian for the African variety, or a mixture of the active seeds with those which have already been impoverished by treatment with alcohol.

The chemistry of strophanthus is also ill-defined; extracts and tinctures of various strengths are used, and even the strophanthin from strophanthus kombé is sometimes amorphous and sometimes crystalline, which may have either a lamellar or a needle-like shape. Further, the experiments with strophanthin from strophanthus kombé do not give results concordant with those obtained from the strophanthin of strophanthus glabre.

The results obtained by various experimenters who have studied the physiological action of this drug are also not in accord with each other.

M. Lemoine has found that by repetition of the dose a chronic form of poisoning may be induced not less dangerous than an acute toxic effect from excessive doses. After death from chronic poisoning in animals there is found a nephritis comparable to that resulting from an infectious origin.

In men suffering from nephritis an increase in the amount of albumin has been observed, and also hæmaturia has followed the use of strophanthus.

As a cardiac drug it has been compared to digitalis, and by some vaunted as superior, in being less violent and more lasting in its effects upon the heart.

It is asserted, on the contrary, that strophanthus does not augment the heart's action, that it lessens the force of the precordial blow, and that the pulmonary second sound is diminished in intensity. That the vascular tonicity is diminished, and the heart is relieved by lessening the resistance in the peripheral bloodvessels.

Others assert that strophanthus is a cardiac tonic, but inferior to digitalis. It has also been classed as a renal irritant rather than as a cardiac tonic. Whether it be classed as a drug which acts upon the heart, the vessels, or the kidneys, from the practitioner's standpoint it is desirable to know what conditions call for its administration, and what the contraindications may be.

The most beneficial results are obtained in cases of asystolie, especially those which are accompanied by œdema. The contraindications would be a degeneration of the heart's muscle or nephritis, especially if accompanied by albuminuria.

As regards the diuretic value of strophanthus opinions differ. Fraser and Puis recommend it in the treatment of nephritis, and attribute its diuretic action to an irritation of the renal parenchyma. Others contest its usefulness in these affections. Others are not satisfied with the increase in urine thus brought about; on the contrary, they state that in chronic nephritis the benefit is counterbalanced by the danger of increasing the renal lesion. Further, the albumin is increased under the influence of this drug. There is reason, therefore, to doubt the desirability of using strophanthus as a diuretic, or even in cardiac diseases where there is albuminuria. Moreover, note should be taken whether hæmaturia is present or not, for it is aggravated, and sometimes caused by strophanthus.

Diarrhœa from strophanthus is a common phenomenon among the patients who have taken it, and is an indication of its non-tolerance.

The tincture is the preparation most frequently prescribed, though the extract of strophanthus and strophanthin have been used. At present we should hesitate to substitute stropnanthin for the simple preparations of strophanthus.—*Gazette Hebdomadaire*, January 4, 1889.

Creolin.

A drawback of creolin is, that it causes irritation to mucous surfaces, as, in fact, do most antiseptics. A drop of a two per cent. solution placed on the tongue causes on the part touched a sensation such as would follow a slight burn. The sprays applied to the nares and the pharynx produce also a certain local irritation, and are especially disagreeable in consequence of the penetrating odor of the drug. Taken internally, a dose of a few drops in a potion, it produces an annoying sensation along the whole length of the œsophagus, and gives rise to a taste of creolin which persists during the whole day and produces eructations.

Externally, it may be used in solutions of one to two per cent. to wash wounds or instruments; as an application to the nares or pharynx, five to ten drops to a quart of water is a sufficient strength.

One of the chief advantages of this new antiseptic is said to be, that it is not poisonous; it has been given to dogs in amounts up to one and one-half ounces, and men have taken experimentally two drachms daily, without

serious trouble. On the other hand, a case is reported in a recent number of the *Gazette médicale de Paris*, by M. Rosin, where an injection into the vagina and uterus of a two per cent. solution caused vomiting, subnormal temperature, and death in collapse. The quantity of the liquid injected into the uterus in three days was from seven to eight quarts. This contained about four and one-half ounces of creolin.

As a disinfectant, creolin is efficient; according to Esmarch, a one per cent. solution rids one almost immediately of all bad odors, except its own, which is not agreeable, though better than that of carbolic acid.

In emulsions containing two and a half to five per cent., it is a powerful germicide.

It has been found serviceable especially in diseases of the nose, ears, and throat; Schnitzler recommends it in all affections of the buccal cavity caused by microörganisms; he has found it very useful in tubercular laryngitis.

As regards the internal administration of this drug, it is important to bear in mind the dangers of bringing a substance so irritating as creolin in contact with the stomach and intestines.—*Gazette médicale de Paris*, December 22, 1888.

Experiments made in the bacteriological laboratory at Königsburg, by Dr. Washbourn, appear to prove that creolin, though far less toxic than carbolic acid, yet possesses more distinctly poisonous properties than has been supposed.

Professor Baumgarten also finds that creolin is a strong poison for the animal organism, but the poisonous dose is relatively large, so that the value of creolin as a local antiseptic and disinfectant is not prejudiced by his experiments, which only show that its internal administration must not be pushed too far.

The amount which would have to be absorbed from a wound would be so large that practically there would not seem to be any danger attending its use in dressings.

Experiments by Behring lead him to the conclusion that as an antiseptic it is three or four times weaker than carbolic acid, and that it cannot be relied upon as a disinfectant.—*British Medical Journal*, February 2, 1889.

Nitrite of Ethyl and Spirit of Nitre.

Dr. Leech has contributed an interesting article on the comparative effects of spiritus ætheris nitrosi and solution of nitrite of ethyl.

Pharmacological considerations certainly render the practical identity of the two solutions very probable, Aldehyde, alcohol, and nitrite of ethyl are the principal substances present in sweet spirit of nitre. Paraldehyde is not present in sufficient quantity to exert any perceptible physiological effects. Spirit of nitre has long been a popular remedy for causing an increase in the urine and perspiration. As a diaphoretic, the solution of ethyl is as efficient as the spirit of nitre. The diuretic effect of both preparations does not appear to be high. In cases of difficulty of breathing, due to constriction of the bronchial tubes, and in cases of contraction of the muscular arterioles, the spirit and the solution were found to be of great and equal value; they

tend to prevent the onset of the original attack, and by dilating the arterioles, they relieve an overloaded heart.—*Lancet*, February 2, 1889.

Saccharin.

After the constant use of saccharin for over a year, Dr. H. Macnaughton Jones has never known any injurious effects to follow its exhibition, though several of his patients have substituted it for sugar altogether in their food.

The great mistake generally made with all preparations of saccharin is that the intensely sweetening property of saccharin is overlooked and too much is used, both for purposes of diet—as when it is added to tea or coffee—and when it is prescribed in mixtures, powders, etc.

It has been found useful in disguising the taste of quinine, muriated tincture of iron, antipyrin, salicylate of soda, salicin, the oils of copaiba and santal (either of these oils emulsified by the compound powder of almonds in which the acacia has been increased by twenty-five per cent. and the sugar replaced by an equivalent of saccharin, forms a mixture that is comparatively palatable, and owing to the antiseptic property of the saccharin it keeps much longer than one made in the other way); its utility in emulsions as a preservative is very great, and it is noteworthy in the case of cod-liver oil, guaiacum, hydrastis, cascara sagrada, and chloride of ammonium.

A palatable biscuit for diabetics may be made from gluten flour, 11.5; butter, 2.75; eggs, 8.5; saccharin, 0.01625 in each biscuit.—*Lancet*, February 2, 1889.

Prof. Attfield, one of the editors of the last edition of the *British Pharmacopœia*, has been estimating the place of saccharin in pharmacy, and he has published some thirty galenical formulæ in which saccharin replaces sugar, either without altering the strength of the preparation in any way, or else so modifying it that the saccharinated compound may be termed "concentrated." In the former case the place of syrup is taken by powdered tragacanth, or, in special instances, by gluten.

Prof. Attfield regards the advantages of saccharin as fourfold. It enables many medicinal confections, powders, and lozenges to be given in comparatively small bulk. It is able, by the intensity of its sweetness, to mask the nauseous taste of many drugs; it is not liable to ferment, and hence will yield permanent preparations in place of those made with sugar, which would frequently spoil, especially if submitted to high temperatures in transport. Lastly, the advantage of "sweet," but not "harmfully sweet," is once more urged. The slight solubility of saccharin has been so often remarked upon that good service is rendered by the description of a form of "soluble saccharin," and by the formula for a simple solution of saccharin of the same degree of sweetness as the syrups of the *British Pharmacopœia*. The nomenclature adopted for the various formulæ is admittedly open to serious objection, owing to the confusion likely to arise between saccharium and saccharine.—*Lancet*, January, 1889.

Myrtol as a Disinfectant.

Prof. Eichhorst is of opinion that myrtol will leave all other disinfectants in the background in safety and quickness of action. Myrtol is repre-

sented by that part of myrtol oil which comes over between 160° and 170°. It is a clear fluid of aromatic and penetrating odor, which can be conveniently administered in gelatine capsules. French authors have recommended it in bronchial catarrh, and scattered observations have been made on its disinfecting properties; but a methodical use of this disinfecting substance has not been made, and it is not mentioned in various works on therapeutics.

After taking only one gelatine capsule the breath smells of myrtol within an hour, and the effect lasts from twenty-four to forty-eight hours; but in order to subdue putrid processes, two capsules, each containing two and a half grains, were usually given every two hours. The appetite improves under its use, and the expectoration and breath lose all offensive odor with remarkable quickness. The expectoration diminishes under its use, and the patient feels better. It is not considered to possess a specific action against the tubercle bacillus.—*London Medical Record*, December 20, 1888.

To act as a deodorizer and disinfectant in bronchitis with offensive expectoration and gangrene of the lungs, one may give two or three capsules every two hours, though with three capsules anorexia may follow. In some cases, after using only a few capsules, the offensive odor of the breath and expectoration disappears.—*Therapeutische Monatshefte*, January, 1889.

Our Exaggerated Estimate of the Value of Beef-tea.

In a paper presented at the meeting of the British Medical Association, last summer, by Thomas Laffan, the value of beef-tea is viewed from a double standpoint. First, as a nutrient; and, second, as a mere stimulant and flavorer. It is in the first category that it has been placed by a large number of the profession. Liebig states that the greatest care is taken to exclude from his extract all fibrin, gelatine, albumen, and fat. He further adds, that its component parts do not give strength where there is none, and that to extractives and salts is due all the value it possesses; that it is to be classed with tea and coffee; and that it neither economizes carbon for our temperature nor nitrogen for the sustenance of our tissues. As to the difference between ordinary beef-tea and his extract of meat, he merely claims for the latter that it contains less water than the former.

We have in beef-tea kreatine, kreatinine, carmine, inosite, and other quarternary products, which so entirely resemble, or are so nearly allied to those found in urine, that their small value hardly admits of question; and it is not a matter for surprise that there should be so striking a family resemblance in odor between the two. The saline matters alone, plus the hot fluid, are, therefore, left to play the most considerable, if not the only, *rôle* in the value of beef-tea.

Dr. Hassall, long ago, showed that 14½ pounds would be required to yield beef-tea enough to supply the nitrogenous daily waste of one individaul, calculating that such waste amounts to 512 grains of urea and 21 of uric acid daily.

Experiments made on dogs have brought out the remarkable fact that they die sooner when fed exclusively on Liebig's extract than when left unfed.

There are three leading methods for manufacturing the article under discussion.

Under one method, the heat is kept below the coagulating point of albumen.

Under the second method, the heat is carried above the coagulating point of albumen.

Under the third method, the meat is merely macerated, and no heat at all is applied. This extracts a larger percentage of juice than is attainable by the application of heat.

When treated by cold water the meat yields up six parts per hundred, and under boiling water only three parts per hundred.

Another method proceeds on a different basis. One pound of meat to four pints of water is simmered for five or six hours. It is strained, and any portion not small enough to pass through the collander is further broken up until it is enabled to do so.

This article is infinitely richer than ordinary beef-tea, but where solid food is inadmissible, its administration requires further investigation.

An analysis of a sample of this preparation gave the following results:

Water	94.65 parts.
Albuminates and crystalline bodies, kreatine, etc.	4.25 "
Fats	0.20 "
Salts	0.90 "

Another sample extracted from the same part, under one of the old systems, was also analyzed. It was made from beef, the same in quality, but *two pounds* of meat to two pints of water, macerated for four hours, and subsequently simmered for six. No strainer was used, but the meat débris was excluded; the resultant was clear.

Water	98.48 parts.
Albuminates and crystalline bodies, kreatine, etc.	0.90 "
Fats	0.07 "
Salts	0.55 "

Kühne states that while the intestinal juice would dissolve raw albumen and fibrin, it would not act on boiled albumen and fibrin unless the latter were first subjected to the action of the pancreatic juice. When the latter, however, was the case, the dissolving process took place quicker than even when the meat was raw. Now taking the analysis of Hassall, who found only 22.1 grains of nitrogen in each pint of beef-tea (one pound to the pint) made under the boiling, and 41.1 grains made under the infusing process, and the further opinions of Seé and Liebig, it is quite plain that we have in beef-tea, properly prepared, no value whatever commensurate with the cost, and an insignificant nutrient for the sustenance of the sick.

If beef-tea then affords such small aid, what shall be used?

The first and chief resource in the way of liquid food is, of course, milk. The next substitute for beef-tea is minced raw meat. When we find this successfully employed in conditions of the system in which superficial ulceration of the intestinal membrane constitutes the essential feature, and where that membrane is still more acutely inflamed, as in the infantile cholera of summer, it is hard to set limits to the cases to which its employment may not be applicable.

Lastly, we have rectal alimentation, to supplement any deficiencies of mere

fluid ingesta, such as Leube's pancreatic emulsion. Milk will be found applicable to the great majority of cases, while one or more of the others may find their utility in a percentage of cases.—*Brit. Med. Journal*, January 26, 1889.

Cocaine in Cancer.

After the removal of the entire left breast for cancer the disease reappeared. During three months the usual intense pain which accompanies such cases set in, and was not relieved by the ordinary remedies after a fair trial.

An ointment of cocaine, 1 in 20, had a marvellous effect. The pain was subdued almost immediately, and continually kept under control by its use. It was used for two months, there having been no occasion during that time even to increase the strength. The patient died without the least suffering.—*Lancet*, January 26, 1889.

MEDICINE.

UNDER THE CHARGE OF

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Walter Mendelson, M.D., OF NEW YORK.

The Geographical Distribution of Rickets, Acute and Chronic Rheumatism, Chorea, Cancer, and Urinary Calculus in the British Islands.

Isambard Owen (*Lancet*, January 19, 1889, 124) says that upward of 3000 replies have been received to the inquiry-papers sent out by the Collective Investigation Committee of the British Medical Association. The results of such inquiry must be taken in a general sense only, and not too much stress laid on points of detail. With these provisions they may be summed up as follows: 1. There was no district in the British isles in which acute and subacute rheumatism and malignant disease were not common. 2. Rickets, although not unknown in rural districts, was mainly a disease of towns and industrial regions, and especially of large industrial towns. It was rare in Scotland, the North of England, North Wales, and Ireland, with the exception of Ulster; more common in the rural districts of Ulster and the rest of England, and especially frequent in Cornwall, Kent, and North Essex. 3. Chorea was also mainly a disease of towns and industrial regions, though by no means unknown in rural districts. It was fairly evenly distributed in the rural portions of the four counties, rare at the seaside resorts, and, by exception, rather uncommon in Glasgow and in the south and the west of London. 4. The distribution of chorea was proportioned to the prevalence of acute and

subacute rheumatism. 5. Urinary calculus exhibited a tendency to affect the eastern coasts of the two islands; its chief seat in South Britain being the county of Norfolk, and in North Britain the angle of land above Aberdeen. It was less prevalent in the coal fields, and especially apt to appear in the Black Country.

The Pathology of Pernicious Anæmia.

Wm. Russell (*British Med. Journ.*, January 12, 1889) says that the first question arising in the consideration of this subject is, whether the disease is the result of diminished formation of red corpuscles or of their increased destruction. It seems an accepted fact that the red marrow of the bones is at least one, if not the most important seat of the production of the red blood-cells, and that the liver is certainly one of the sites of their destruction. In 1875, Pepper and Tyson found that in pernicious anæmia the yellow marrow of the long bones was transformed into red marrow. It seems hardly possible that when there is this great increase in the red marrow, there should be a diminution in the formation of red corpuscles. Rather must we assume that there is an extraordinary effort on the part of this blood-producing tissue to meet the demand for red corpuscles, and that it consequently undergoes hyperplasia. We have next to consider pernicious anæmia from the side of increased destruction of the blood. When there is destruction of the corpuscles, the hæmoglobin decomposes and forms a yellowish pigment, which is hæmatin, or some allied substance capable of giving an iron reaction to ordinary tests. The iron present in normal red blood-cells cannot be demonstrated in this simple way.

To test an organ for decomposed hæmoglobin, a small portion of it is put for some minutes into a solution of ferrocyanide of potassium, and then transferred to dilute hydrochloric acid, whereupon a blue color will be developed if the decomposed hæmoglobin be present, and this will vary in intensity with the amount of the blood pigment. In a case of pernicious anæmia under his observation, the author found marked evidences of blood destruction in the liver, spleen, and kidneys. Other writers have also reported an increased amount of iron in the latter organ. It seemed desirable to make a series of observations on the iron reaction in cases of other diseases. For this purpose he examined the livers of forty-four cases of different affections, and the spleens and kidneys of some of these. The results showed (the figures are given) that in a considerable number of cases there were evidences of destruction of blood in the liver and spleen, and even in the kidneys; not constantly present in the spleen, and unusual in the liver.

He concludes, accordingly, that pernicious anæmia is one of certain conditions characterized by an increased destruction of blood corpuscles. That this destruction is due to the condition in which the blood reaches the liver, and not to the action of the liver itself, is shown by the fact that in all the cases in which the liver gave a very marked iron reaction the spleen did so likewise. The ultimate question concerns the nature of the blood condition which leads to this exaggerated destruction. It may be that some process in the elaboration of the corpuscles is defective, or that some blood purifying organ is at fault. What it is cannot yet be decided, and further pathological observation is demanded.

Procursive Epilepsy.

Ladame (*Rev. Méd. de la Suisse Romande*, 1889, No. 1, 5) makes an exhaustive study of this disease, citing a number of authors not mentioned in the article of Bourneville and Bricon, and reporting an interesting case. As a result of his study, he concludes—

1. Procursive epilepsy is a form of disease in which the attack is manifested by an impulsive running forward, accompanied generally by a fit, with loss of consciousness, but rarely by aura.

2. This form of epilepsy is peculiar to childhood and youth.

3. It may last several years before being transformed into the ordinary form of epilepsy. During the transformation it may assume sometimes one form, and sometimes the other, but sooner or later, and sometimes suddenly, the change is accomplished.

4. It is impossible to localize accurately the anatomical seat of this form of infantile *haut mal*. There is certainly nothing to authorize the supposition that a lesion of the cerebellum may be the organic cause of procursive epilepsy.

5. The disease seems to develop preferably in those individuals who present a coarse lesion of the encephalon. It is probable, however, that, like all other forms of the disorder, it may manifest itself without appreciable organic lesion of the nervous centres.

6. Procursive epilepsy is frequently complicated by moral insanity.

Acromegalia.

Virchow (*Deutsch. med. Wochenschr.*, January 24, 1889) exhibited before the Berlin Medical Society a new case of acromegaly, and the skeleton from the case which Fräntzel reported a year before. The disease is to be classified as a partial giant growth (Riesenwuchs), though it is not yet possible, in the state of our knowledge, to make a sharp distinction between it and the universal giant-growth. It has been claimed that the beginning of the affection is connected with puberty, but Virchow denies this, and cites two cases, including the one exhibited by him, where it appeared quite early in childhood. It would seem in some instances as though heredity played some *rôle* in its production, but other cases show no trace of its influence. Nor had there in his patient been any early abolition of the sexual functions, since he had begotten six healthy children.

Besides the general overgrowth of the extremities and of the bones of the face, which constitutes acromegalia, there may be sometimes an hypertrophy of single parts. The author exhibited a plaster cast of a hand from such a case, showing an excessive overgrowth limited to the first and second finger. The question is sometimes raised whether acromegalia is not allied in some particulars to myxœdema; but while in the first affection the soft parts are hypertrophied as well as the bones, there is no instance of myxœdema recorded in which the bones were involved.

Comparison of acromegalia with general giant-growth shows many points of similarity, and other points of sharp differentiation. In acromegalia there is a marked disproportion between the length of the extremities and of other

parts. The author gives statistics to show that the ratio of the length of the feet and of the head to the total length of the body is decidedly greater in this affection than in the normal condition, or in the case of two giants to whom he refers. The cause of the disease is not clear. As it is evidently, for reasons which he explains, not to be included under leontiasis osseum, osteitis deformans, or arthritis deformans, it is best considered as an independent disorder.

Caseous Concretions of the Tonsils.

Under this title V. Gautier (*Rev. Méd. de la Suisse, Romande*, 1889, No. 1, 21) describes the very abnormal distention of the crypts of the tonsils with cheesy matter. He knew of no literature upon the affection until the recent monograph of Jacobson came to his notice, containing a report of a case, and a bibliography of the subject. Jacobson calls it "Algosis faucium leptothricia," since it has been discovered that the caseous masses consist chiefly of leptothrix buccalis. He collected seventeen cases from German medical literature, and added three of his own observation. The presence of these accumulations is rarely attended by fever or even dysphagia. Gautier relates the case of a woman in whom these masses resembling perfectly white buttons, which formed one or two at a time on the tonsils, and after reaching the size of a pea or bean detached themselves and fell on the base of the tongue. There were absolutely no subjective symptoms, except a slight malaise felt one or two evenings before the day on which the masses were discharged. She sought treatment on account of the very unpleasant odor which the liberated substance possessed. A portion examined microscopically on one occasion consisted of a dense, felt-like mass of leptothrix threads with cellular débris. The treatment consisted in incising the anterior wall of the crypts, emptying them, and cauterizing them with a solution of chromic acid.

Recurrent Pneumothorax.

Samuel West (*Brit. Med. Journ.*, Jan. 12, 1889) reports an interesting example of this condition. The patient, an apparently healthy man of twenty-two years of age, had for some days suffered from shortness of breath, which he had first noticed on getting out of bed in the morning. Physical examination of the chest clearly revealed the presence of pneumothorax without effusion, and in the process of resolution. The dyspnœa was so slight that the patient rebelled against being kept in bed. The subsequent history of the case is simple, as recovery went steadily onward, and in the course of a month the difference between the two sides of the chest was scarcely perceptible. The previous history of the patient was good, and there was no disease to which the development of the pneumothorax could be attributed. The interesting part of the story is, that about six months before, while walking quietly, he had been suddenly seized with pain below the clavicle, shortness of breath, and cough, incapacitating him from all hurry and great exertion for about a fortnight. About three months after this he again became short of breath on the morning after playing football violently, and continued so for a month. These two previous attacks were stated to have

been exactly similar to the one observed by West, and the strong probability is that they were due to pneumothorax. The authors refers to the case reported by Gabb, in the *British Medical Journal*, some months previously, and states that these two cases show that a patient may have repeated attacks of pneumothorax and yet recover. He also calls attention to two facts well established but not generally known, and which this case illustrates; namely, that pneumothorax not infrequently occurs in the apparently healthy, and that it may develop in a latent, insidious way, without the violent symptoms often seen.

Treatment of Suffocative Pneumothorax by Permanent Thoracic Fistula.

Bouverst (*Bull. Méd.*, 1889, No. 7, 107) has recently witnessed two cases of pneumothorax which he denominates "suffocative," in which the chief symptom consisted of an intense dyspnœa increasing constantly without any remission, and terminating rapidly in death by asphyxia. Both the clinical and post-mortem examinations showed that the air in the pleural cavity was under a high degree of tension. The author says that it is impossible that the increased tension can be due to air entering the pleural cavity during inspiration, as has been stated by various writers, and claims that the entrance occurs during cough, when the tension in the bronchial tubes is very greatly raised. Cough is consequently very dangerous in pneumothorax, and is to be combated by full doses of opium; but in cases of suffocative pneumothorax this will be insufficient. In such a case the indication is to evacuate the air, just as one would evacuate a huge pleural effusion. A simple puncture is not enough, as the air at once begins to reaccumulate. The author therefore recommends and has practised the making of a permanent fistula, leaving the canula in position. This must be done under antiseptic precautions, using a canula 4 cm. long and 3 mm. in diameter. An antiseptic dressing should be applied, in order to prevent, as far as possible, the formation of a pyothorax.

The Graphic Record of Physical Signs in the Investigation of Heart Disease.

A very valuable article on this subject is contributed by A. E. Sansom (*Lancet*, Jan. 19, 1889). He lays great stress on the necessity of precision of observation and of precision of record, but says that this is to be attained with the expenditure of as little time as possible. The dress must be completely removed from the chest, and this protected from cold by a warm wrap. The patient must then be placed in such a position that both sides of the thorax are presented in like conditions. As the impressions conveyed to the ear are more fleeting than those recorded by the eye, it is necessary to indicate visibly the physical signs discovered; and for this purpose an aniline pencil, or, still better, a dermatographic pencil, may be used.

It is carefully noted by *inspection* whether the apex beat is visible, and if so, dots are to be made with the pencil over the area where it is observed. Pulsation in the epigastrium, regions of the aorta or pulmonary artery, or in the vessels of the neck, is denoted by the sign "pn" at the point where it is seen.

If venous pulsation, write "V pn;" if with the pulsation there is retraction of the thoracic wall, use the sign "S retrn." A notable bulging of any portion of the surface can be outlined by dots.

Coming now to *palpation*, the area of the apex-beat, as indicated by the application of the tip of one finger, may be outlined by short broken lines, in contra-distinction to the dots used for inspection. Pulsations felt elsewhere are to be recorded in the same way. The position of a thrill is indicated by a serrated line. If the thrill is presystolic, it comes to an abrupt end at the beginning of the ventricular systole, thus differing from the systolic and diastolic thrills. This abrupt ending may be indicated by a vertical line at the termination of the horizontal serration; the length of the latter having some relation to the duration of the thrill. The use of the finger as a plexímeter for *percussion* is wanting in precision. The author therefore employs a vulcanite pleximeter in the shape of an inverted "T." The portion of this applied to the chest measures one and a half by one-half inch; the slender vertical column is one and a half inches high, and the upper cross-piece measures three-quarters by three-eighths of an inch and is set parallel to the lower plate. In using it, this lower plate is pressed against the chest wall by the tips of the fore and middle fingers. The mind is to be fixed on *vibrations*, whether heard or felt by the finger-tips, and at the spot where the vibrations are sensibly modified a line is to be drawn with the pencil. By approaching the heart from different directions, and uniting the marks thus made, the outline of the cardiac dulness is determined and denoted. In many cases the border of the right ventricle can be distinguished from the liver. The author claims that this method of percussion is of the greatest accuracy, as has been confirmed by numerous post-mortem examinations. He states the limits of the heart as shown by it, and explains the diagnostic and prognostic indications of some of the changes in the area of dulness, as well as the differences in the character of the note heard over different portions of this region.

For *auscultation* it is frequently better to employ a double stethoscope. Any accentuation of any of the normal sounds can be expressed by the sign + within the area in which such accentuation is noted. All murmurs are also to be indicated. An "S" denotes the presence of a systolic murmur at the point at which it is placed, and an arrow drawn on the chest shows the direction in which this is propagated. In many cases it is advisable to map out the area of audibility by short broken lines. A diastolic murmur is indicated by a "D" placed at the point of maximum intensity. PrS would denote a presystolic murmur, and broken lines should be used to show the area in which it is heard.

Having now made on the chest a map or graphic record of the signs observed, it remains to copy such a record for reference. To accomplish this the lines and signs delineated should be retraced with a small camel's-hair brush dipped in bland colorless oil. A piece of tissue paper is now gently pressed over the surface, and on this the marks of the oil will be readily reprinted. Placing this on a smooth surface the marks are again gone over with a pencil, and a permanent record is obtained. By the aid of carbon paper a copy of this may be made in the case-book. Outlines made at sub-

sequent examinations can be compared with this, when any changes will be at once noticed.

On Heterologous Struma of the Kidneys.

Strübing (*Deutsch. Arch. f. klin. Med.*, B. 43, H. 6, 599) reports two cases of struma of the kidney and reviews the literature of other reported instances of it. He sums up his conclusions by defining renal struma (which in reality springs from tissue of the supra-renal bodies) as characterized by the formation of large cysts filled with peculiar bloody and fatty contents. Viewed from a clinical standpoint it shares the characters of other malignant tumors of the kidney, and presents the same difficulties of diagnosis. In such cases the urine is usually free from abnormal constituents, but may, at times, wash down with it the contents of the cysts and softened tissue. The continued presence of serum-albumin, not due to the evacuation of a cyst, indicates a complication, whose cause is to be sought for. Both kidneys can be the seat of the new formation, though this is unusual. It will depend on the degree of injury to the secretory parenchyma, whether the series of secondary changes in the organism appear which are produced by chronic insufficiency of the renal activity. Renal struma produces metastasis. A puncture of the cyst is only to be performed for diagnostic purposes, but the question of total extirpation of the diseased kidney is to be entertained, if the struma, as is usually the case, is confined to but one kidney, and there is no reason to suppose that the secreting parenchyma of the other has been injured by inflammatory processes or the like. This radical operation should be undertaken as soon as possible, in consideration of the ability and tendency of the struma to form metastasis.

Atrophy of the Gastric Mucous Membrane.

George Meyer (*Münch. med. Wochenschr.*, Jan. 29, 1889, 83) has found this condition in a considerable number of stomachs, the atrophy being complete in four cases and progressing in the others. Etiologically, the atrophy arises from a chronic catarrh, which is either primary or secondary to a malignant growth or to toxic gastritis. The process may be one of two kinds. First, it may be of a degenerative nature, consisting of an infiltration of round cells, chiefly from the surface, so that the glands are forced to lie obliquely or even horizontally, and are, finally, partially obliterated and replaced by a formation of cysts, with only here and there a remnant of glandular structure. The *muscularis mucosæ* is thickened, and connective tissue projections from it extend toward the mucous surface. Secondly, the process may be of the character of a formative irritation of the intra-glandular tissue. In this the naturally scanty connective tissue grows thicker, strangles the glands, leaves a network with large meshes, and causes a disappearance of the *muscularis mucosæ*. These two processes, the parenchymatous and the cirrhotic, are often commingled. The author suggests the term "phthisis ventriculi," on the ground that the other names applied are unfitting.

The gastric wall may be of normal thickness, thinner than it should be, or greatly thickened. The author reports a case in which this last condition obtained. The process begins, as stated, usually on the free surface of the

mucous membrane, leads to the formation of cysts, and, finally, to a broad band of connective tissue. All traces of the glands finally disappear. Sex appears to have little influence in its production, but it is most apt to develop in the latter years of life. Carcinoma, even in distant parts of the body, plays an important *rôle* in its etiology. The duration of the disease appears to be between nine months and two years, as nearly as can be determined. The symptoms, though not constant, are dilatation of the stomach, disappearance of the natural secretion and of mucus, diminution of the gastric movements, cardialgia. All these symptoms attend chronic gastritis, carcinoma, and neuroses.

The diagnosis is often impossible, but an important symptom is the good general condition and the absence of emaciation, which indicates more than an outward relation to progressive pernicious anæmia, especially when digestive disturbances attend the latter affection.

The prognosis is unfavorable, and therapeutics can offer little, though lavage with hydrochloric acid and arsenic may be tried.

In view of what has been said, the author deems it important, 1, that all patients with carcinoma of any organ, and who present any symptoms of pernicious anæmia, have the functions of their stomach tested; 2, that after death the organ be histologically investigated; 3, that the condition of the vagus, sympathetic, and Auerbach's and Meissner's plexus be studied.

Intermittent and Latent Albuminuria.

The following is an abstract of the conclusions drawn by Dr. George Johnson, expressing the main points of his paper in the *British Medical Journal* of February 2, 1889, and embodying his views published in previous articles.

1. The presence of albumin in the urine, though small in amount and occasionally intermittent, is always pathological.

2. The practice of testing the urine in all, even the most trivial, ailments has revealed albuminuria in many youths and adolescents exposed to cold, wet, and over-fatigue, but who have not lived long enough for the ultimate evils of a neglected albuminuria to become developed.

3. The albuminuria of persons in apparently good health has no such special features as to require the application of such misleading terms as "physiological," "functional," "cyclical," and the "albuminuria of adolescence." It is of common occurrence in each sex and at any age.

4. In almost all instances these cases of albuminuria may be traced back to some exciting cause.

5. Nearly all cases of acute nephritis pass through the stage of intermittent albuminuria in their progress toward convalescence; and conversely, most cases of intermittent albuminuria may be traced to an acute nephritis.

6. Intermittent albuminuria, though having existed for years, is a curable condition, if only its exciting causes can be ascertained and counteracted by appropriate treatment. The neglect of such means, however, may convert it into persistent albuminuria, and this ultimately results in fatal degeneration of the kidneys.

7. Since albumin may exist in the urine of persons in apparent health, the

importance of examining the urine of all patients, and all applicants for life insurance, is obvious.

8. Since albumin may be present at one portion of the twenty-four hours, and absent at another, it is necessary to test the urine, not only after rest in bed and before breakfast, but also after food and exercise.

With regard to the question of albuminuria in life insurance, each case must be considered individually. The author, however, considers that no prudent man would recommend that an individual with a trace of albumin in his urine be accepted at an ordinary rate of premium.

SURGERY.

UNDER THE CHARGE OF

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Tetanus.

At a recent *séance* of the Société de Thérapeutique, M. Guelpa, after reviewing the history of the scientific study of tetanus, formulated the following conclusions as the result of his own observations made in conjunction with M. Weber. First, tetanus is an infectious disease. Second, although the horse is one of the animals most apt to contract this disease, it is certain that, contrary to the opinion of Verneuil, tetanus is not of equine origin; a telluric origin appears more probable, but that designation is also too restricted. We are probably within limits in admitting simply a bacterial point of departure. Third, tetanus is not the direct effect of microbes, but the consequence of poisoning through substances secreted by them. Fourth, at least during the first tetanic manifestations, the growth of the bacilli remains limited to the region of the wound. It is only later, and then very rarely, that there is any generalization of the bacillus in the organism. Fifth, as regards treatment, there are three indications: the destruction of the seat of lodgement of the bacilli; the elimination of the products of those microbes; the sedation of the nervous system. The first may be accomplished by vigorous curetting, or even deep excision, and by the use of lotions and dressings with strong solutions of sublimate (5 to 10 to 1000), or, perhaps still better, by the use of strong solutions of nitric or sulphuric acid. The elimination of the soluble poisons secreted by the microörganisms will be favored by the very free use of diuretics and diaphoretics, or by hypodermics of pilocarpine, which appears to have a specific action upon the bacillus of Nicolaiez. Finally, large doses of chloral will serve as the best sedative for the nervous system.

At the *Académie des Sciences*, M. Bassano reported some observations upon the attenuation of the tetanic virus by passing through the cobaye. He has observed that animals inoculated with infectious earthy materials succumb

in about four days. Those inoculated with pus from the first died at the end of one day, those inoculated with pus from the second series perished in forty-eight hours, while the pus from the latter does not cause death for about five days. He recommends the most minute disinfection of all wounds, no matter how insignificant in appearance, whenever there is the slightest reason to suppose that they have been infected.

Syphilitic Reinfection with Persistence of Previous Symptoms.

Dr. Augusto Ducrey reports (*Giornale Italiano delle Malattie Veneree e della Pelle*, December, 1888) the case of a woman, forty-six years of age, who, many years previously, had contracted syphilis while in intimate relations with a woman in the early secondary stage of the disease. There was a complete history of full secondaries, roseola, characteristic pains, adenopathy, etc. Shortly after she married, and, with the exception of a soft sore contracted from her husband, remained healthy for ten years. At the end of that time the husband, after an impure connection, developed an indurated sore, followed by indolent buboes, roseola, mucous patches, etc., and soon after she presented herself for examination. She showed a characteristic gumma of the scalp, multiple cicatrices of pustular and tuberculo-ulcerating syphilides, and atrophic scars of recent date following the reabsorption of dry tubercles, while, at the same time, she showed a specific cicatricial induration of the right labium major, universal poly-adenopathy, a maculo-erythematous syphilide on the trunk and limbs, mucous patches on the soft palate and the velum, syphilitic fever, and rheumatoid pains. The coincident infection of the husband, of course, threw much light on the case. The gummous and tubercular character of the old lesions was unmistakable, the only possible lesion with which they could have been confounded being lupus, from which they differed widely in the character of the sores, the crusts, the age of the patient, and the history of the case. The recent eruption became finally a very widespread small pustular (acneform) syphilide, which involved every portion of the cutaneous surface but the face; the osteocopic pains became intense and unbearable; ulcerating mucous patches developed, together with extreme tumefaction of the inguinal glands, and a severe iritis of the left eye. At the same time the sore upon the scalp deepened and assumed the unmistakable characters of a deep gummatous ulceration. (The condition of the scalp and the general surface at this time is illustrated by two chromo-lithographs.) The case resisted treatment for some time, but was finally cured by means of hypodermic injections of corrosive sublimate. Dr. Ducrey draws the following conclusions:

1. Syphilitic reinfection is possible.
2. It may occur even during the existence of tertiary symptoms due to the preceding infection.
3. The pathological effect of the second inoculation may be precisely those of an ordinary syphilis, with the same succession of identical symptoms; or the second attack may even be one of special gravity.
4. The reinfection of a subject of previous syphilis is not a certain proof that he was cured at the time of the second infection, and therefore the possibility of reinfection is not decisive evidence of the curability of syphilis.

Cerebral Abscess.

Von Bergmann, in a recent address on cerebral abscesses (reported in *The Medical Press and Circular*, January 2, 1889), stated that it should be borne in mind that cerebral abscesses are always secondary. In a table of 70 cases given by Baer, chronic suppurative otitis was the cause in 55 instances. In other cases the abscesses originated in bony inflammation of other parts of the skull, or in injuries attended with hemorrhage, or were metastatic. When in a case of chronic suppuration of the middle ear fever comes on, evidence of mastoid disease should be looked for—tenderness, swelling, redness, local œdema, etc. If these symptoms are absent, then evening fever becomes an important indication of deep suppuration, perhaps even in the cavum cranii.

If the symptoms of shivering, heightened temperature, disturbed digestion, nausea, retching, and vomiting, which sometimes become worse in the evening, are an indication of suppuration generally, we must seek further to determine whether the suppuration is such that it, possibly by its volume, causes other symptoms—for example, whether in the case of being intracranial, it causes increase of intracranial pressure. In order to diagnosticate cerebral abscess, therefore, we search not only after symptoms of suppuration, but also for signs of cerebral pressure.

It is of importance when, although the temperature of the body rises and shivering comes on, in spite of these febrile symptoms, the pulse shows itself positively less frequent. If, in addition, there is violent headache, a special significance attaches to the febrile movement, which may then indicate an abscess in the interior of the skull cavity, and this diagnosis is, of course, vastly strengthened in the presence of localizing symptoms.

It may be made, therefore, especially in those cases in which injury of the parietal or motor region of the brain has taken place, and in which, in the course of time, symptoms like those above mentioned have added themselves. It is now sufficiently well known, since the brain has been so much experimented on, that large slices can be removed from the temporal lobes without any function of the body necessarily suffering.

Von Bergmann operated on the case which gave rise to these remarks—one of otitis media—and evacuated a large quantity of pus. He inserted a drainage tube and packed around it with iodoform gauze. The tube was gradually withdrawn, the symptoms disappeared, and the patient entirely recovered.

Microbes in Congenital Dermoid Cysts of the Face.

Verneuil reports (*Revue de Chirurgie*, Jan. 10, 1889) four observations upon dermoid cysts, in three of which microörganisms were discovered. Two of them were cysts of the floor of the mouth and one a cyst of the skin of the brow. The microbes were of variable forms, susceptible of cultivation, and when inoculated in mice did not seem to possess any pathogenic property. The authors called attention to the following facts: first, cysts in which microbes were found, all of them usually indolent, were when they came under observation rapidly growing. It is possible that the entrance of the microbes may have been a factor in this growth, the causes of which are but little understood. Such cysts often remain stationary for many years. Second,

the dermoid cysts of the face entirely develop and are completely closed during intra-uterine life, and can receive the microbe which they contain only through the medium of the vascular system. Third, the presence of microbes in such cysts failing to manifest itself by any subjective symptoms furnishes a new example of what Verneuil has described under the name of latent microbism.

Œsophagotomy and Pleural Section for Foreign Bodies.

Dr. George Fischer reports the following case (*Deutsche Zeitschrift für Chirurgie*, December, 1888):

A forester, aged fifty, who had been affected with chronic laryngeal catarrh for over ten years, swallowed a fragment of bone while at supper. His own efforts to remove the bone were futile. He immediately sought medical advice, and the physician passed a sound with a sponge point, but failed to discover any foreign body, even with the aid of the laryngoscope. The symptoms of choking, however, soon disappeared, and the patient returned home. Three weeks later pain in the throat and difficulty in swallowing were complained of, and at the same time the patient was annoyed by most offensive sputa. Upon examination a slight swelling was observed at the back of the pharynx. An incision was made in the swelling but no pus found. The copious discharge continued, and was extremely offensive. The case was diagnosticated as perforation of the œsophagus by a foreign body, together with retro-œsophageal abscess.

Œsophagotomy was performed soon after; the tissues were found dense and the lymphatics enlarged, but there was no point of ulceration. Great difficulty was experienced in finding the œsophagus. After cutting through the omohyoid muscle the operation had to be continued with great care, and even though the operator had reached so far that he could plainly feel the spinal column through the opening of the wound, yet he was unable to locate the œsophagus until a large ball-pointed sound had been introduced. The œsophagus was then opened and a large drain tube (unperforated) was inserted into the opening, and through this milk was poured into the stomach. The whole wound was then packed with iodoform gauze and over this a wad of iodoform dressing. The drainage tube was left protruding from the dressing. During the operation no foreign body was found. For three weeks following the patient had no symptoms of fever. Although the wound healed well, and in spite of the absence of fever, the patient's strength gradually decreased, and the copious discharge of offensive sputa grew no less.

After the third week fever set in, the patient was troubled with cough, and complained of a pain in the back; a slight râle could be heard in the back over the lower extremity of the right lung. Percussion was painful, yet no dulness, bronchial breathing, or pleuritic murmur could be found. Three days later an opening was made in the pleural cavity, and a small piece of rib was resected; a large amount of horribly fetid and greenish-yellow pus was discharged, a drainage tube inserted, and the wound treated antiseptically. The patient died on the day following.

In the autopsy the wound of the œsophagus was found to be almost entirely healed; the right lung greatly adherent; a putrid, fibrous deposit covered the lower lobe. In this was a cavity of about two inches in diameter which

was filled with offensive pus. The left lung was free and slightly œdematous; no foreign body was found in either lungs or œsophagus.

The author's conclusion was as follows: A septic process had proceeded in two directions. First, it s owed itself as septic phlegmon of the throat; secondly, a putrid bronchitis with subsequent gangrene of the lungs. He claims that the septic condition of the throat was cured by the operation of œsophagotomy. In conclusion, the operator gives a table of œsophagotomies performed for the removal of foreign bodies. One hundred and twenty have been recorded, eighty-seven of which resulted in recovery and thirty-three in death. This shows a mortality of nearly twenty per cent.

Laparotomy for the Extraction of a Foreign Body from the Peritoneal Cavity.

Le Dentu reports (*Le Progrès Médical*, January 12, 1889) a case in which a wooden spoon having been swallowed, the stomach was perforated, and the spoon passed into the peritoneal cavity in from twelve to fifteen hours after the accident. The perforation occurred on the level of the greater curvature, and the foreign body escaped between the two anterior layers of the epiplöon. It was thought that this explained the rapid cicatrization which prevented the subsequent passage of the contents of the stomach into the peritoneal cavity. The operation showed that no peritonitis had been developed. Either the stomach did not contain any pathogenic germs, or the foreign body freed itself during its passage from those which it brought with it. A gastrotomy was first performed, as nothing in the history of similar accidents led to the suspicion that perforation of the stomach could possibly take place in so few hours. In the absence of symptoms indicating the presence of the foreign body elsewhere, it was logical to seek it in the stomach at first. The result was excellent.

Hepatic Surgery.

Mr. Knowsley Thornton reports (*British Medical Journal*, Jan. 5, 1889) six additional successful cases of operations on the liver and gall-bladder. In three of these there had been previous perforation of the gall-bladder and the formation of abscess; one was a case of hepatotomy for hydatids; in another there was impaction of a stone at the junction of the cystic with the common duct; one was a cholecystectomy following a fruitless attempt to dislodge impacted stones in the ductus choledochus; all recovered.

In the *Berliner klinische Wochenschrift* of January 28, 1889, Dr. W. Körte begins an elaborate review of the literature of the surgical treatment of diseases of the gall-bladder, taking up the various reported cases and considering the indications for operating, the methods employed, and the results. The paper is not concluded in this number.

Mucous Cyst of the Spleen.

Mr. J. F. Haswell reports (*Liverpool Medico-Chirurgical Journal*, January, 1889) the case of a patient who died of cancer of the pylorus, and in whom at the autopsy an interesting condition was observed.

A fulness of the left hypochondrium had been noticed for some time previous to death, and gave on palpation the sense of fluctuation in a smooth-

walled tumor. This was punctured with an aspirating needle, the only result being a small quantity of whitish débris, which, examined microscopically, was found to be composed of fatty globules and cholesterin crystals, with a few granular red bodies. After death the left hypochondrium was found occupied by a large, tense, elastic swelling with smooth, lobulated walls; this was adherent to the spleen, and the pancreas passed along its under surface. Its weight, with the spleen attached, was three and three-quarters pounds (spleen weighed four ounces). Its length was twelve inches, and its breadth five inches. On opening it, semifluid pultaceous matter exuded, mostly in rounded masses of a dirty yellow color; among these were clear, round, jelly-like globules, about the size of a walnut, out of which, when punctured, a clear fluid ran, leaving a collapsed cyst wall. The same microscopic characters of the contents were noted as before mentioned, and no trace of echinococci detected. When the spleen was cut in two, a smaller cyst of similar appearance, with thick fibrous wall, was found in its substance, entirely surrounded by splenic tissue, and near the edge where the other larger cyst was attached. The wall of the large cyst was composed of dense, fibrous tissue, with calcareous plates in places, and there was no line of demarcation between the splenic capsule and the cyst wall.

Cysts of the spleen are so extremely rare that this one appears worthy of record. A very similar one (recorded by Cornil and Ranvier) was met with by Péan, but it seemed to have been larger and to have contained liquid.

Perforation of the Bladder in Pyosalpingitis

Reverdin reports the following case (*Revue de Chirurgie*, Jan. 10, 1889): A woman twenty-three years of age, who had had a gonorrhœal vaginitis in 1882, and who had had one child and one miscarriage, presented herself for examination, and was found to have a large fluctuating swelling in the left iliac fossa descending into the vaginal cul-de-sac. There was a purulent endometritis, and an exploratory puncture above Poupart's ligament revealed the presence of pus. A trocar was thrust through the vaginal cul-de-sac and a large quantity of purulent matter was evacuated. The trocar was allowed to remain in place, antiseptic injections being employed throughout. The following day, drainage being imperfect, the trocar was replaced by a large rubber tube, which, however, became displaced on the fourth day, necessitating a new incision. This caused profuse hemorrhage from one of the arteries of the broad ligament, which could be arrested only by the use of the hæmostatic forceps. Laparotomy was then performed, an incision five inches in length being made parallel to Poupart's ligament. As soon as the abdomen was opened it was seen that the bladder was perforated; the posterior cul-de-sac was opened and the suppurating cavity drained through the vagina; the vesical perforation was stitched to the abdominal wall, a rubber tube being passed through it and brought out through the urethra. Afterward it was drawn into the bladder and a little later withdrawn entirely. The hypogastric fistula then closed, the vaginal drain answering all purposes. The patient entirely recovered.

Gonorrhœa and its Relations to Salpingitis.

Dr. J. William White reports (*British Medical Journal*, February 9, 1888) a case of removal of the uterine appendages for disease consecutive to

gonorrhœal infection; emphasizes the difficulty of recognizing some forms of venereal diseases in the female; and discusses the views of Noeggerath, Sinclair, and other gynecologists, which he believes to be extreme. He arrives at the following conclusions:

1. Gonorrhœa in the male is an entirely local and thoroughly curable disease.

2. The so-called "latent" gonorrhœa is due to changes in the mucous membrane of the urethra which, while they may be due to the persistence of a specific microbe, are apparently explicable by other circumstances, namely, the delicacy of the mucous lining of the urethra, and the conditions of approximation of its surfaces during the intervals of micturition, which is here, as elsewhere, unfavorable to the disappearance of granular or injected areas, or of the traces of inflammation; the periodical passage along the canal of a secretion, the urine, which is especially liable by reason of changes in its constitution to become an actual irritant; the exposure of the whole region at times of erection to intense congestion of its vessels; the effect of gravitation, the proportionately excessive supply of blood to the region, and the absence of extravascular resistance due to the elastic character of the spongy tissue, all of which favor the persistence of any vascular engorgement or congestion left after a first attack of urethritis. When in addition we consider the frequency with which gonorrhœa produces submucous thickening at some point in the urethra, causing an encroachment on the calibre of the canal, and, from obvious mechanical reasons, the production of discharge, we can understand that many of the cases of "latent" gonorrhœa can be explained without reference to the existence of a specific poison.

3. While awaiting definite microscopical evidence upon the subject, it should not be forgotten that there are marked differences between gonorrhœa as we observe it clinically, and those diseases known to depend upon a specific poison. The absence of a definite period of incubation; the fact that it may be produced with all its characteristic symptoms by a variety of agents, chemical, traumatic, and infectious; that it predisposes to, instead of protecting from, a second attack; that it is associated only with the ordinary processes of inflammation, and that it may be reawakened or produced at will by mechanical irritation, seem strongly to differentiate it from most specific diseases.

4. It is quite possible, even if gonorrhœa does not depend for its origin primarily or exclusively upon the gonococcus, that under certain circumstances the suppuration which accompanies it may favor the development of these or other forms of bacterial life, which in such cases might greatly increase both its contagious quality and the probability of its rapid extension in the infected individual. These cases in women constitute the class which comes most naturally under the attention of the gynecologist, to whom, indeed, they have usually been referred by the surgeon or general practitioner. They do not happen, after all, with great frequency, and, when they do occur, are by no means followed in all, or even in the majority of instances, by the serious and alarming sequelæ which have been described.

5. In many such cases a line of treatment which includes rest in bed, elevation of the pelvis, counter-irritation, hot antiseptic vaginal injections, and anaphrodisiacs with arterial sedatives, will result in cure.

6. In some instances gonorrhœa undoubtedly produces consecutively en-

docervicitis, tubo-ovarian abscesses, and pelvic peritonitis, and necessitates a resort to operation, but these instances are comparatively rare or exceptional.

Syphilitic Cervical Spondylitis.

Prof. Breda Achille (*Giornale Italiano delle Malattie Veneree e delle Pelle*, December, 1888) reports the case of a man fifty years of age, the subject of old syphilis, with adherent cicatrices of the scalp, the neck, and the supraclavicular and deltoid regions consecutive to old gummata, and with contraction of the right lung resulting from a specific interstitial pneumonia. The posterior pharyngeal wall was swollen and projected forward to the level of the palato glossal folds. Pressure on the head, on the lateral aspect of the neck, and especially on the wall of the pharynx through the mouth, with counterpressure on the cervical spinous processes, gave rise to great pain. The painful region was that of the bodies of the third, fourth, and fifth cervical vertebræ; the former was especially prominent and tender. Flexion of the head on the chest was painful, extension still more so, and the movements of rotation gave rise to exquisite suffering. Mercurial inunctions and full doses of the iodide of potassium resulted in subsidence of these symptoms; leaving, however, a noticeable tumefaction about the spine of the third cervical vertebra, which remained for some months slightly tender upon pressure.

Achille reports, also, an interesting case of spontaneous fracture of two or more ribs, as a sequel of specific osteitis.

The Persistence of the Regenerative Power of Nerves.

Prof. C. Vanlair (*Archives Roumaines de Méd. et de Chirurg.*, January, 1889) records the results of his investigations into the effect of second operations upon the same nerves, and concludes that when the integrity of a nerve has been reëstablished after complete division, a second resection may be followed by a second and equally complete regeneration. He formulates his conclusions as follows:

It is not impossible to obtain experimentally the reproduction of the same nerve several times in succession. Outside of unforeseen accidents, the only obstacle to these multiple regenerations consists in the endoneurial thickening of the peripheral segment, the thickening occasioned by the excessive multiplication of the sheaths of Schwann, but this difficulty is easily overcome by the centrifugal pressure of the new fibres. It is, besides, more than compensated for at the time of the second reproduction by a considerable increase in their power of proliferation.

As to the reproductive ability of the nerve, it is virtually inexhaustible. One can even say that its activity increases as it is subjected to new proofs. In other words, then, the nerves possess the faculty of reproducing themselves indefinitely, just as do the connective and bony tissues. They can always repair any loss of substance, provided they find a suitable conductor. There is thus a demonstrable force which the experimenter can dispose of at his will, and which, well directed, will constantly produce its effects, so that the regeneration of nerves in the last analysis is subject to two conditions: on one side, a *vis medicatrix naturæ;* on the other hand, mechanical influences, which, according to their employment in one way or another, may aid in a reparative process, or render it ineffective.

OTOLOGY.

UNDER THE CHARGE OF

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A Study in Physiological Acoustics.

Mr. J. A. Maloney, of Washington, D. C., has conducted "a line of experiments to obtain, if possible, true graphic delineations of the voice" (*New York Medical Journal*, November 17, 1888). By perfecting his recording mechanism he has obtained the best records we have ever seen. He has shown most clearly, the number of vibrations to the inch, of the test-words employed, the entire length of letter- or word-wave, the total number of vibrations to each, and also the depth of imprint.

He proposes to apply these results in a second set of experiments, to solve some of the mysteries of audition, and also to obtain clews as to the nature of the changes in the middle ear when these test-words are heard imperfectly.

Cocaine Anæsthesia in the Ear.

Dr. Barth, of Berlin, at a recent meeting of otologists held in Cologne, September 18, 1888, presented, among other forms of anæsthesia, that by means of cocaine electric cataphoresis (*Archiv für Ohrenheilkunde*, Bd. 27, February, 1889). According to a suggestion of Wagner, he soaks a piece of cotton-wool with a solution of cocaine (8 to 10 per cent.), and fastening it to the positive pole places it upon the spot to be anæsthetized, and allows it to remain thus in contact for fifteen or twenty minutes. The negative pole is placed at the same time upon the nucha. By this mode of anæsthesia Dr. Barth has performed paracentesis membranæ tympani and incisions into the walls of the auditory canal without the patient's feeling it. Invariably, he stated, when cocaine cataphoresis was used, the sensibility was markedly reduced.

In the ear, cocaine anæsthesia is valuable only for operations, not for quieting pain from inflammation.

Novel Means of Diagnosis of Perforation of the Membrana Tympani.

Dr. E. Pins, of Vienna, has recently suggested two novel means of detecting small perforations in the membrana tympani (*Wiener med. Presse*, December 30, 1888). In cases where inspection and inflation, the ordinary methods of detecting a perforation in the drum-membrane, fail, it is suggested to fit into the auditory meatus a small whistle, which will give forth its note when air is forced into the Eustachian tube, if there be ever so small a perforation in the membrana. The kind of whistle recommended is such as is found in dolls and other toys. These give their sound upon the lightest entrance of air. There is, however, a paradox to be overcome, viz., the fact that a strong blast of air, with a short route, will not produce a sound in the

whistle. It is, therefore, necessary to connect it with the auditory meatus by means of a piece of rubber tubing 20 to 25 cm. long. Slight inflation of the middle ear will then bring forth the sound of the small diagnostic instrument.

The second method consists in filling lightly the auditory canal with a powder, like boric acid, magnesia usta, lycopodium, etc., after the ear has been thoroughly dried by means of absorbent cotton. If a perforation exists in the membrana tympani, inflation by Politzer's or Valsalva's method, or by the catheter, will cause a small cloud of dust to come from the external auditory meatus. By either of these methods a perforation may be demonstrated to a number of bystanders, as in a class or clinic.

Pathological Conditions in Cases of Perforation of the Membrana Flaccida.

At a recent meeting of German Naturalists and Physicians, September 18, 1888, Dr. A. Hartmann, of Berlin presented some specimens of the changes in the drum-cavity which accompany perforation of the membrana flaccida (*Archiv für Ohrenheilkunde*, vol. 27, Feb. 1889). Three of the subjects had died of abscess of the brain, and a fourth had perished from thrombosis of the sinuses. In a fifth case, the patient had suffered during life with uncomplicated chronic purulent otorrhœa, with an anterior inferior perforation in the membrana tympani (m. vibrans), and a cicatrix in the membrana flaccida.

In the tympanic cavity these changes were noted: In three instances the attic (upper drum-cavity) was found shut off from the atrium (lower part of drum-cavity) by membranes passing from the neck of the hammer forward and backward between this bonelet and the inner and outer wall of the tympanic cavity. Membranes were also found stretched from the tendon of the tensor tympani forward as far as the upper part of the tympanic opening of the Eustachian tube, and backward to the entrance of the mastoid cells. In one case the separation by this means was complete; in two cases a small opening existed in front of the tendon of the tensor tympani, between the anterior part of the attic cavity and the anterior part of the lower tympanic cavity. There were besides in three cases synechial formations between the membrana tympani and the inner wall of the drum-cavity.

When such conditions prevail, the communication between the Eustachian tube and the perforation in the membrana flaccida is cut off. In such cases a thorough removal of inspissated secretion and impacted matter can be obtained only by using some form of the tympanic syringe.

In the fourth case, synechiæ existed between the hammer, the incus, and the inner wall of the drum-cavity, by which the posterior part of the attic cavity was shut off from the inferior hinder portion of the lower drum-cavity. In the fifth case, cicatricial bands connected the hammer and incus with the outer wall of the attic cavity. The opening in this partition was filled with a plug of exudation. The therapeutic conclusion from these conditions is, that when the membrana tympani and the auditory ossicles are removed, these pathological bands between the membrana tympani and the ossicles on one side, and the walls of the drum-cavity on the other, must be thoroughly cut through, in order to facilitate removal.

Metastatic Processes emanating from Otitis Media.

Dr. Sigismund Szenes, of Buda-Pesth, has reviewed the literature of this subject, and gives his own observations in an interesting and valuable article in a recent number of the *Deutsches Archiv für klinische Medicin* (Dec. 24, 1888).

"Although otitis media, in having its seat very near the brain, can readily pass into the latter, it is not impossible for the purulent secretion from the ear to pass by the lymphatics and bloodvessels to other organs as important as the brain, and there set up a process similar to that in the ear, which event can be warded off only by a timely recognition and treatment of the original aural disease."

The writer, after reviewing the cases of embolism from aural disease in organs other than the brain, gives three cases in his own experience. In one there were embolic abscesses in the lungs, kidneys, liver, and spleen; in a second case, with acute purulent otitis in both ears, there developed a cold abscess under the left clavicle. This case recovered entirely. In a third case, an acute otitis media was followed by a periostitis about the previously healthy molar tooth on the same side, after the ear-symptoms had disappeared. Metastatic processes from ear disease have been recorded as occurring in the following organs: the lungs, the pericardium, the joints, the liver, the pleura, the periosteum, the bones, the omentum, the bladder, the various glands, the kidneys, the spleen, and in the brain. Several organs may be attacked at the same time, and there may ensue a general pyæmia.

Treatment.—The treatment must be directed to both the primary and the secondary disease. The ear must receive energetic treatment. "As long as a suppuration in the ear continues, it is impossible to say how, when, or where it will end, nor to what it will lead." (Wilde.) Antiseptic measures are to be tried first, and if they fail, then astringents may be tried. If a metastatic abscess forms, it must be opened if it can be reached easily and safely. In the inflammatory stage we must depend upon antiphlogistics and rest in bed.

When an otitis occurs, therefore, we must bear in mind it ought to be treated from prophylactic motives, if from no other. For so long as it continues the patient is threatened with severe evils from metastasis.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Vapor of Steam and Sulphur in Diphtheria.

T. Wyld Pairman, of Auckland, N. Z., highly extols (*Edinburgh Med. Journ.*, February, 1889) continuous inhalations of steam under a tented bed, improvised by placing a sheet over an opened umbrella fastened to the head of the bed, and burning a teaspoonful of sulphur in the apartment every hour.

Encysted Abscess of the Tonsil.

Garel (*Annales des mal. de l'oreille*, etc., January, 1889) reports three cases. According to his researches, the abscesses occasionally subside spontaneously, but are much more frequently recurrent, and remain encysted for several months, or even for years. He is of the opinion that the discharge of the original abscess takes place by a circuitous route, and that the hypertrophied tissues through which it passes prevent complete effacement of the walls of the abscess; the opening cicatrizing prematurely, whether it had been spontaneous or artificial.

Puncture with the incandescent caustic point, with counter-puncture if necessary, and topical irritant applications to the interior of the sac when large, appear to be the most effective treatment.

Angeioma of the Larynx; severe Hemorrhage after Operation.

Ferreri (*Lo Sperimentale*, December, 1888) reports a case of angeioma the size of a hazelnut, on the inferior portion of the left vocal band. It was crushed with forceps. Alarming hemorrhage took place at night, with difficulty controlled by applications of ferric chloride. Despite a tracheotmy, violent hemorrhage took place as the operation was finished, and although the parts were tamponed successfully, death ensued within forty-eight hours by infectious pneumonitis.

Laryngeal Tuberculosis.

Dr. A. Sokolowski reports (*Wien. klin. Woch.*) six instances of spontaneous cicatrization without topical treatment, three instances of cicatrization under pencillings with lactic acid, and one under six weeks pencillings with silver nitrate. The cure had been maintained thus far one year in two, and four years in the third of the series treated with lactic acid; and three years in the case treated with silver nitrate. In a series of 50 cases treated without topical interference, improvement took place in 8, only 16 per cent. In a series of 50 cases submitted to topical treatment, improvement took place in 40, or 80 per cent. The improvement consisted in complete relief to hoarseness and dysphagia in 9 cases; decrease in infiltration and cicatrization of ulcerations in 31.

Laryngeal Carcinoma, its Diagnosis and Treatment.

In an elaborate essay ("Der Kehlkopfkrebs, seine Diagnose, und Behandlung," *Deutsche med. Woch.*, Jan. 3, 10, 17, 24, 31, and Feb. 7, 1889) illustrated, with some exquisite reproductions from microscopic sections, Dr. B. Fränkel, of Berlin, alludes first to the different forms in which carcinoma begins in the larynx.

The most frequent form he has seen is that of a tumor on a vocal band; polypoid carcinoma. At first there is no other symptom than hoarseness. This is not due to any immobility of the vocal band, but rather to the mechanical interference with the tonal qualities of the vocal membrane. It is not peculiar to carcinoma. The majority of laryngeal carcinomas occur in

men beyond forty years of age. Hence age and sex may be, to some extent, aids in the diagnosis, but are not positive indicators. This polypoid carcinoma of the vocal band presents in the commencement as a flat, broadly sessile elevation. It penetrates toward the interior of the tissues, instead of growing more into free space, as is the case with benign growths. The epithelium becomes destroyed, and the surface then appears either flat or rugose, and grayish or whitish. This form is usually the keratoid or horny carcinoma. In preparing excised fragments for microscopic examination, great care must be taken to make the sections perpendicular to the surface, so as to avoid mistakes in their interpretation. This important point is discussed in detail. In another class of cases the carcinoma of the vocal band is diffuse; and has the disposition to extend in superficies instead of forming a circumscribed tumor. At first it can hardly be distinguished from any other thickening of the mucous membrane. Small hemispherical nodules from the size of pin-heads to that of linseeds project from the diffuse tumefaction; sometimes one only, sometimes several. Some portions appear lardaceous; others hyperæmic. Almost invariably one band only is affected. Growth is slow. It may take a month for the thickening to exceed a few millimetres. There is less tendency to extension in depth than on the surface, until, finally, the entire vocal band becomes involved. Even then the band maintains its general contour and its motility. In three cases in which excised fragments were examined, the inspection revealed simple carcinoma (Waldeyer). In keratoid carcinoma the cornification is the prominent feature; in simple carcinoma, it is the papillary formation. The impaired motility of the band to which Semon has recently called attention, has been noted by Fränkel only when the growth occupied the posterior portion of the vocal band where the vocal process penetrates the soft parts. In such cases median position of the band soon took place. In one instance only has he seen this median position in a carcinoma commencing in the anterior portion. In this case the bilateral median position of the vocal bands was found *post-mortem* to be due to imbedding of the two recurrent nerves in symmetrically enlarged glands, the size of small hazelnuts, which had not been perceptible during life. The diagnosis of this form is made either by watching its progress and its failure to respond to internal medication, which consumes considerable time; or by removing a fragment and submitting it to microscopic examination. Should this investigation be negative, similar fragments should be submitted to examination from time to time.

Polypoid and diffuse carcinoma occur in the ventricular bands and aryepiglottic folds, but the chalky-looking masses do not present. The tumefaction is red, sometimes redder than the healthy tissues surrounding. The polypoid form is more distinctly dendritic than on the vocal band. The extension, though slow, is rather more rapid than where there is pavement epithelium.

Carcinoma of the posterior wall of the larynx soon causes impaired motility of the vocal bands, and sometimes causes painful dysphagia at the commencement. Early examination of excised fragments is necessary because involvement of this region soonest renders unilateral excision an insufficient radical procedure.

Carcinoma of the ventricle causes at first no other change than to force the

ventricular band and the aryepiglottic fold toward the free space of the larynx; and it remains for a long time covered and concealed by those structures. It soon produces mechanical impairment in the outward excursion of the vocal bands. Finally, the ventricular band is forced so far forward in the interior of the larynx as not only to cover the vocal band but also a portion of the opposite half of the larynx. An instance of ventricular carcinoma is illustrated, the microscopic examination of which revealed a characteristic glandular carcinoma. It was seated in a rather thick layer of dense connective tissue and thus formed an adenoid fibrous carcinoma. Fränkel thinks that it is quite probable that ventricular carcinoma frequently begins in the numerous glands in this situation. Its diagnosis from inspection is very difficult; but prolonged observation eventually shows that the ventricular band and aryepiglottic fold are not swollen, but are pushed outward; and a point is noted as the apex of the deformity, from which the parts gradually slope into the normal tissue surrounding. Laryngoscopy offers no conclusion as to the nature of the tumor. Almost the only other tumor occurring in the ventricle is the gumma. The differential diagnosis of gumma is usually practicable by its absorption under antisyphilitic treatment.

Carcinoma of the vocal band has a great disposition to extend along the contiguous squamous epithelium, and it reaches the opposite side either along the anterior commissure, or along the posterior wall. In this way the circular forms are produced, involving both vocal bands and, with the exception of the posterior walls, usually only limited portions of the larynx, and chiefly in the subglottic region. If it be polypoid carcinoma, the vocal bands look as though bestrewn with nodular outgrowths. The carcinoma extends far more deeply than is apparent on inspection. [The compiler might mention an instance in which a carcinomatous growth the size of a small bean as viewed laryngoscopically, turned out on extirpation to be but the intra-laryngeal portion of a growth the size of a large hazelnut, extending encapsulated into the pyriform sinus.] The glottis often becomes so occluded as to produce laryngeal stridor, so that tracheotomy becomes necessary in many instances to avert suffocation. Diffuse carcinoma does not produce stridor, even though both vocal bands are implicated their entire length. When the circular carcinoma extends to the ventricular bands, these structures become covered with red nodules the size of small peas. The ventricular bands swell and cover the vocal bands so that mere stripes remain visible.

Carcinomas extending to the ventricular bands, the aryepiglottic folds, and the epiglottis, usually become dendritic or cauliflower-like in their further development. This is the form most frequently described and depicted.

Laryngeal carcinoma takes sudden stages of recrudescence after intermittent intervals of apparent quiescence; and gradually produces stridor, which may proceed to asphyxia. Glandular swelling is less frequent, and is later in occurrence than in carcinoma of the majority of other organs. It is sometimes absent, even in cases that have been fatal. This fact is of great importance in reference to prognosis and treatment. Minute glandular swellings of the neck are difficult to feel in the living subject. On the other hand, cases occur in which, at a certain period, the glandular swelling in the throat is the most prominent symptom complained of, and the only symptom of the disease in the absence of laryngoscopic inspection. An instance in point

is noted in which a keratoid carcinoma of the vocal and ventricular band barely exceeded the bulk of a bean. Thus it is difficult to estimate the value of tumefaction of lymphatic glands in the diagnosis of laryngeal carcinoma.

The carcinomatous tissues have a tendency to undergo disintegration at a certain stage. The process is ulcerous at first, and gangrenous later. This period is dependent upon special conditions. Sometimes extensive and deep-seated infiltration of the vocal and ventricular band takes place, even to the bulk of a considerable tumor, without a trace of ulceration. In other cases carcinomas apparently small and superficial undergo more or less ulcerative disintegration on the surface. Nevertheless, these carcinomas may have penetrated deeply into the tissues. Ulceration is an indication that such extension has already taken place. Despite the friction to which the parts are subjected in performance of function, ulcerous destruction is a late manifestation, and does not take place until the carcinoma has existed for a year at least. With the appearance of ulceration the period of tumor growth closes—the most important period in a therapeutic point of view. The ulcerations are usually recognized very readily in the laryngoscopic image. They are surrounded by tumid masses sometimes smooth, sometimes with dense borders, sometimes covered with outgrowths similar to papillomas or granulation nodules. When the ulcerative process becomes more extensive, it may present an appearance similar to the ulceration in tuberculosis or in syphilis. Rapid disintegration gives rise to a peculiar fetor which sometimes proclaims the diagnosis before laryngoscopic inspection has been made. When doubt exists as to the character of an ulceration, fragments of the tissues at the margins should be repeatedly excised for microscopic inspection, although in many instances there may be no characteristic evidences detected. Sometimes the diagnosis can be made by microscopic inspection of the sputum. Cicatrization has been known to take place in a few instances, two cases being cited from the practice of von Bergmann and of Krönlein respectively.

The duration of the ulcerative stage of carcinoma varies, but usually extends over a number of months. Then the third period begins. This is characterized by deep-seated disintegrations, especially necrosis of the cartilages, gangrene of the superficies, and extensions into neighboring organs. The penetrating carcinoma attacks the connective tissue, the elastic membrane, the muscles, and the glands. As to penetration of the cartilage, while Fränkel has not yet investigated Schottelius's observation that carcinoma penetrates into medullary and vascular cartilage only, he can confirm the observation that it readily attacks ossified cartilage, especially the thyroid and the plate of the cricoid, as well as the lower portions of the arytenoids. It grows uninterruptedly into reticulated cartilage, such as the vocal process, but usually surrounds hyaline cartilage. When carcinoma penetrates a cartilage, the portion attacked undergoes disintegration, and the intact portion becomes detached from its connections and crumbled. Then it is often coughed out. The healthy cartilage in the neighborhood of the extending carcinoma undergoes calcification. Additional necrosis of cartilage is produced by perichondritis. Purulent inflammation of the perichondrium is a frequent complication of laryngeal carcinoma, and the destructive process extends far more deeply than is indicated by the superficial evidence. Extensive implication is found in marked contrast to the comparatively small, crater-like ulcer on the surface.

Apart from evidences of carcinomatous infiltration in the vicinity, there is nothing characteristic in the laryngoscopic image of perichondritis at its commencement, yet it is usually recognizable by the coexistence of the tumor, sometimes ulcerated, which has produced it. Its course, too, shows that it is produced by a slowly progressive process. Fränkel has found its recognition difficult in one class of cases only, in which carcinoma on the anterior pharyngeal wall produced perichondritis of the plate of the cricoid, or of the arytenoid, or of both together. The specific fetor usually indicates the carcinomatous condition in doubtful cases, and careful examination will usually detect the carcinomatous infiltration in its vicinity, or the tumor, as may be; and, after a time, microscopic inspection of expectorated or excised particles and of secretions may confirm the diagnosis. Perichondritis, especially when complicated with œdematous tumefaction, may produce sudden asphyxia, even when there has been no precedent stenosis. Should symptoms of stenosis have been present, they will be rendered more or less acute by the purulent perichondritis.

Special mention must be made of those cases in which carcinoma develops in the thyroid cartilage, and can be felt from the outside. This occurs in two ways. The thyroid cartilage may become much thicker, and feel like an almond shell, or like a crab shell (Isambert). The thyroid cartilage may become penetrated. Then, between the skin and cartilage, soft, tumid masses are felt, which move with the larynx in glutition. Superficial examination may lead to mistaking them for abscesses. If they are incised, the fact of tumor becomes evident. Finally, the carcinoma may penetrate the skin and produce laryngeal fistula. Death may occur by suffocation; or, and more frequently, by aspiratory or by glutatory pneumonitis, the glutatory pneumonitis being more frequent of the two; by exhaustion; and by complications, such as descent of pus, hemorrhage, suffocation by compression, or by filling up the air-passage below the end of the canula, etc.

Treatment.—As carcinoma is a local malady, in the beginning it should be treated *in situ* by removal, so long as it remains a local lesion. The earlier and the more thorough this removal, the less the chance of recurrence. Recent experience has much improved the prognosis of active therapeutic measures. The method of eradication will depend on the individualities of the case. Intra-laryngeal eradication is practicable in some instances. Fränkel here refers to his own case, in which, between 1881 and 1884, he extirpated a carcinoma intra-laryngeally after four consecutive recurrences; the patient, a man seventy-seven years of age, having remained ever since in perfect health, and able to speak in a loud voice. He mentions five other instances in which he has attempted intra laryngeal eradication. One of them he has not heard of since. One man, sixty eight years of age, has remained free from recurrence for two years; one has remained well permanently; one has remained well up to date, six months; and in one the attempt failed, and the affected vocal band had to be removed from the exterior after preliminary laryngo-fissure. In this instance, microscopic examination of the extirpated vocal band showed that the greater portion of the tumor had been removed intra-laryngeally; but that some papillæ had penetrated inward as far as the musculature.

Endo-laryngeal efforts are justifiable only when laryngoscopic inspection indicates the probability that the tumor can be removed *in toto*. Successful

endo-laryngeal procedure is practicable in the early forms of small polypoid carcinomas which are thoroughly accessible, and more especially in cases of diffuse carcinoma. The proper instruments are the cutting forceps and the snare. The electro-cautery is hardly worthy of consideration, as it is not calculated to destroy tissues very deeply. Furthermore, Fränkel believes that he has seen undestroyed carcinomatous masses excited to more rapid growth under the influence of the hyperæmia attending detachment of the eschar.

In all instances in which endo-laryngeal methods fail, or are, from the nature of the case, impracticable, partial extirpation of the larynx must be practised pretty early. Fränkel seems to recognize limited extirpation of soft tissues alone, as partial extirpation of the larynx. Literally, this view is correct. Chirurgically, simple excision or eradication of the growth and surrounding tissue, without sacrifice of skeletal structure, cannot be regarded as partial extirpation of the larynx.

Antiseptic precautions, the use of the tampon-canula, or operations on the hanging head, have so diminished the laryngo-fissure that it now becomes an operation that is not to be regarded as dangerous. Its dangers in carcinoma are due to lateness in operation; the prognosis being dependent upon the age of the carcinoma. The instances of death and of recurrences have taken place in cases of already ulcerated carcinoma, or tumors which have invaded the cartilages, or the vocal and ventricular bands, and have acquired considerable extension in superficial surface. The definitely cured cases have been operated upon almost exclusively in a more or less early stage. It is better to submit the patient to laryngo-fissure for the removal of a tumor which cannot be eradicated endo-laryngeally, even though it should prove to be a gumma, a sarcoma, or a tuberculous tumor instead of a carcinoma, than to risk the patient's life by waiting too long. The error which injures the patient is the one which prevents the early extirpation of the carcinoma. Uncertainty in diagnosis should never lead to too long a postponement of the operation. It is practicable to make the diagnosis during the operation. The larynx being divided, a small portion of the tumor can be excised, and a section be made with the double knife, and submitted to microscopic examination while further operative procedures are suspended for the few minutes necessary.

In removing carcinoma, the incisions should be made into sound tissues, distant at least one centimetre, when practicable, from the macroscopic limits of the growth. Fränkel has found cancer nests microscopically more than a centimetre distant from the apparent macroscopic limits of ulcerative carcinoma of a vocal band. The frequency of recurrence in cases of some standing, is due to this invisible extension. It is only in the early stages that a reasonable probability of limitation to the macroscopic growth can be entertained. Fränkel urges that, whenever possible, the thyroid and cricoid cartilages, and the mucous membrane of the entrance of the larynx should be retained. The retention of the cartilages secures a passage for respiration; and the retention of the filaments of the superior laryngeal nerve in the mucous membrane of the laryngeal entrance guards against pneumonitis from glutition. Therefore, these parts should be retained if they have not been invaded by carcinoma. It suffices, too, to remove the vocal band only, when the carcinoma has not extended beyond. While everything must be removed that may be be dis-

eased, care should be taken to operate so early that too much need not be removed. Fränkel calls attention to the fold which is produced when one vocal band has been extirpated, and to the irregularities upon its surface, which may readily be mistaken for recurrence of carcinoma.

While total extirpation is dangerous, and comparatively few patients are actually saved by it, there is every reason to believe that earlier operation, and improvements in its surgical technics, will gradually render the procedure more and more successful. In this connection Fränkel advises that the decision be left to the patient after all the contingencies have been faithfully communicated. [To this the compiler does not accede. He believes that the physician must accept the full responsibility of the profession he practises, and that he should advise the patient which is the proper course. Patients apply to physicians for advice as well as for treatment, and they have a right to exact the advice. The physician is in better mental condition to estimate the prospects of recovery than the unfortunate patient can be, even when himself a physician as familiar with the phases of the subject as his medical adviser should be. If the circumstances are such as to justify reasonable doubts as to a successful result, the voice of the physician should be raised against the laryngectomy. If the prospects are decidedly favorable, then the operation should be advised; if prospectively favorable, it should at least be countenanced. Should the patient decide to run the risk, despite advice to the contrary, then the physician has no further right to object; and his duty requires that he should take every precaution to reduce that risk to its smallest dimensions, with as much circumspection as though it were taken at his own solicitation against the predilection of his patient.] In those cases in which unilateral exsection is no longer successfully practicable, and in which total extirpation cannot be performed, Fränkel recognizes the indication to remove as much of the carcinoma as is possible. For this purpose laryngo-fissure is to be made, and the parts to be exsected, scraped out, or burned away, as may best fulfil the indication. He believes it to be possible at times to fulfil this indication by way of the natural passages, if a tracheal canula has been introduced.

When radical operation is impracticable, palliative treatment alone remains. Practically nothing is to be gained by internal remedies and topical medication.

Tracheotomy becomes necessary to avert death by asphyxia. It should be performed as soon as stridor becomes habitual on exercise and the like. This not only prevents death by suffocation from sudden increase in stenosis, but it prevents cardiac debility from long-continued impediment in due oxygenation of the blood. The fatality following tracheotomy may be attributed in part to the fact that it had been postponed too long. Fränkel would have it performed when the evidences of stenosis first become permanent, not when they have been present for a few hours only. Low tracheotomy should be performed because laryngeal carcinoma has the tendency to extend downward.

The remaining palliative treatment consists in careful supervision of the nourishment. The patient should be accustomed to take liquid and semi-solid food as soon as there is any stenosis of the gullet; and eventually to submit to the œsophageal catheter, and to artificial nourishment when it becomes necessary. Topical applications of menthol and of cocaine will obtund pain

in swallowing. Fetor may be controlled by deodorizing inhalations and insufflations. Narcotics play a great *rôle* in rendering life endurable. The tenure of life is so short that extensive use of morphia can be made without hesitation, on the score of inducing morphinismus.

The following conclusions close this timely, thoughtful, and instructive essay:

"Laryngeal carcinoma can almost exceptionally be safely recognized at its commencement by laryngoscopic inspection, and by microscopic examination of fragments removed for the purpose. The eradication of early forms by endo-laryngeal procedures, or by partial extirpation of the larynx, justifies the inference that the majority of cases are susceptible of permanent cure."

Laryngectomy; Statistics.

Dr. W. H. von Krajewski, of Warsaw, makes (*Deutsch. med. Wochen.*, January 24, 1889) the severest detailed criticism of Mackenzie's statistics that has yet been published. He shows that forty-four of Mackenzie's cases must be reduced to twenty-two, on the score of reduplication, owing chiefly to their having been accredited from reports published in some instances at considerable intervals, and in others by being accredited to both operator and reporter.

Voice after Laryngectomy.

In our December issue we noted a communication by Dr. Hans Schmid concerning a patient who had undergone laryngectomy, and who was able to speak aloud without the aid of an artificial phonal apparatus. This case has been carefully studied by Drs. Struebing and Landois (*Deut. med. Woch.*, Dec. 27, 1888). The mechanism by which phonation is produced in this instance is explained as follows: A space has been left beneath the base of the tongue which can be dilated and compressed by muscular exertion. This space acts like the bag of a bellows in place of the lungs, and drives the air-current necessary for speech. The patient throws the base of his tongue forcibly against the posterior wall of the pharynx, leaving a narrow slit, the walls of which act as the phonal reeds. This adventitious glottis, so to speak, seems to be formed chiefly by the styloglossus and the muscles of the pharyngeal wall; while the compression and extrusion of air are effected by the stylo-hyoids and the ceerato and chondro-pharyngei.

Wound of the Larynx.

Cazal (*Bull. Méd.*, April 8, 1888; *Annales des mal. de l'or.*, etc., Jan. 1889) reports a case of minute wound from a fragment of glass beneath the vocal bands, and which produced death by reflex spasm. Unfortunately, a proposed tracheotomy had been given up on account of apparent permanent subsidence of the spasm. This but adds additional confirmation to the views long held by the compiler, that precautional tracheotomy is the only certain avenue of safety for a patient subject to spasm of the larynx, no matter what the cause, as long as that cause has not been removed. Better hundreds of scars from tracheotomy wounds among those who would escape without it, than a single life lost by neglect to perform the operation.

Dendritic Hypertrophies of the Turbinated Bodies.

Mr. W. Spencer Watson (*Med. Press and Circular*, Dec. 19, 1888) reports and illustrates three instances of voluminous hypertrophy of the posterior segments of the inferior turbinated bone, very large, and so dendritic or fimbriated as to resemble papilloma, and one of them associated with a cyst. They were removed by slicing off the implicated portion of the turbinated bone with a ring-knife passed through the nasal passage and then hitched over the nose with the assistance of a forefinger passed behind the palate. Watson alludes to the fact that papillæ are not known to exist on the mucous membrane of the turbinated bone; but Seiss, of Philadelphia, has recently described (American Journal of the Medical Sciences, February 1, 1889) the formation of hypertrophic papillæ as very frequent in cases of hypertrophic rhinitis of long standing, multiple papillomata of very minute size springing from the surface of the turbinated tissue. Similar hypertrophies have been well described and figured by Woakes.

OBSTETRICS.

UNDER THE CHARGE OF

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The Duration of Legitimate Pregnancy.

At a recent discussion on this question in the Berlin Obstetrical Society, Olshausen (*Centralblatt für Gynäkologie*, No. 1, 1889) stated his belief as follows: "When ability to breathe is taken as a criterion of life, this phenomenon may occur at 160 to 165 days of fœtal life. Viability is not present before 195 days. The possible duration of pregnancy must not be limited, as ordinarily done, to 300 days, but must be extended to 320 to 325 days—at least to 310 days. In the case of children born in widowhood, the period of legal pregnancy should be 320 days. Illegitimate pregnancy should be limited to 300 days as a possible duration."

A Fatal Case of the Vomiting of Pregnancy.

Kingman (*Boston Medical and Surgical Journal*, Feb. 7, 1889) reports a fatal case of the vomiting of pregnancy. The conditions present were a maltreated and sensitive stomach; a rheumatic diathesis; a strongly compressed waist; a uterus strongly anteflexed, cervix eroded and flattened against the floor of the pelvis; the os and ovaries extremely sensitive. Applications to the cervix gave temporary relief; straightening and lifting the uterus were temporarily efficient. The os was finally stretched and a four months' macerated fœtus was born.

The patient died suddenly, apparently from thrombosis, as the endocardium had been roughened by rheumatism. The patient was a primipara, previously in good health.

Sterilization of the Female Genital Tract.

Steffeck (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band 15, Heft 2) has conducted an extensive series of experiments upon the practical disinfection of the genital tract. For the purposes of the obstetrician, the vagina and cervix only need sterilization, as it has been shown that bacteria in normal puerperal cases do not exist in the uterine cavity. Such sterilization is best effected by inserting two fingers into the vagina, and thoroughly douching the vagina and cervix with one quart of bichloride of mercury solution (1 to 3000), or carbolic acid solution three per cent.; to maintain a sterile condition, a similar vaginal douche must be given every two hours. During labor, and especially during protracted and complicated labor, the utility of sterilization of the genital tract to prevent infection is obvious.

For gynecological purposes, before operation, it is necessary to remove cervical secretions by cotton dipped in bichloride solution, wash out the uterus with carbolic acid solution three per cent., and tampon the cervix with sterilized or iodoform gauze. Such sterilization suffices for four hours, after which bacteria may multiply. Steffeck found creolin inferior to carbolic acid and mercury as a disinfectant. Eight varieties of bacteria were found in the secretions of cervix and vagina, all of which colonized at the body temperature after twenty-four hours. No effort was made to determine which of them were pathogenic; it is safest to destroy all alike when infection is feared.

The Conversion of Face and Occipito-posterior Positions into Occipito anterior Positions by Manipulation.

Loviot (*Bulletins de la Société Obstétricale de Paris*, Nos. 10 and 11, 1888), reports a case of face presentation in which an attempt to correct the position of the head by raising the chin *per vaginam* and depressing the occiput by abdominal pressure failed; the hand was then introduced into the uterus, the membranes ruptured, and the occiput brought down. As a tendency to posterior rotation of the occiput persisted, the occiput was rotated sufficiently to permit the application of the forceps, and delivery effected with the occiput in its normal position.

Two cases of posterior rotation of the occiput are also reported, in which anterior rotation was effected by introducing the hand into the vagina, four fingers placed upon the head posteriorly, the thumb anteriorly, the head turning during a pain without great difficulty. In a third case the occiput showed a tendency to rotate posteriorly after it had been dislodged; the forceps was immediately applied and delivery effected. In a fourth case the hand was not removed after the occiput had been turned, but the left blade of the forceps was passed at once, guided by the right hand; the head was prevented from rotating by this blade, and the introduction of the right blade was easy; labor was terminated without difficulty.

Loviot employed chloroform when an anæsthetic was required; he considers manipulation, with antiseptic precautions, and the subsequent application of forceps, the most effective method of correcting abnormal positions of the head.

Causes Producing Breech Presentations.

Törngren, of Helsingfor (*Archives de Tocologie*, No. 12, 1888), from the study of 261 pelvic presentations, concludes that breech presentation without

the prolapse of the limbs occurs when the centre of the uterus occupies the centre of the abdomen and pelvis, and the fœtal breech is at the upper border of the pelvic inlet; also, when the uterus is oblique in the pelvis, the fundus being on the same side with the fœtal back.

The feet present when the uterus is in the median line, the breech being just above the superior strait, or when the uterus is oblique, the fundus being on the same side with the smaller fœtal parts (hands and feet). Presentation of the knees occurs when the long axis of the fœtus does not coincide with the axis of the pelvis, or when the breech remains above the dynamic pelvis, the feet resting upon the pelvic margin at the superior strait.

Prolapse of the Placenta, without Placenta Prævia.

Münchmeyer (*Archiv für Gynäkologie*, Band 33, Heft 3) reports two cases of prolapse of a normally attached placenta in which the placenta was born before the child. The first was a multipara with a flat, rhachitic pelvis; the fœtus was in head presentation. Labor proceeded without hemorrhage until the os was dilated; the head failed to descend; the placenta was not perceived on examination. The placenta suddenly presented, after several strong pains, in the vagina by its fœtal surface. The patient was immediately anæsthetized, the vagina disinfected, and the hand introduced and the placenta expelled. The membranes had ruptured at the border of the placenta, they were otherwise intact. Neither fresh nor previously coagulated blood was found on the placenta. The cord was cut, and it was found that the feet of the fœtus lay beside the head. Extraction by the feet was attempted, but the size of the fœtus and the impaction of the arms rendered it impossible, and embryotomy and craniotomy and delivery of the head with the cranioclast were performed. The mother suffered from parametritis with abscess, but recovered.

The second case was twin pregnancy in a multipara; after a prolonged first stage a female child was born living; there was no hemorrhage nor did examination reveal a presentation or prolapse of the placenta. The cord was short (between twelve and thirteen inches long) but was not ruptured. Examination revealed a placenta presenting by its fœtal aspect which belonged to the second twin. The expulsion of the child (stillborn) and placenta followed; the placenta of the first twin was then removed. The two placentæ had been slightly adherent at the chorionic surface; both were *placentæ marginatæ*. The mother recovered without complications.

Münchmeyer has no explanation for the prolapse of the placenta in these cases; he mentions the following diagnostic points between prolapse of the placenta in placenta prævia and prolapse when the placenta is not prævia. Prolapse of the placenta when not prævia gives no sign or symptom for diagnosis except sudden failure of fœtal heart-sounds during labor, placenta prævia and prolapse are diagnosticated by hemorrhage; in placenta prævia the fœtus often perishes during pregnancy, in prolapse when not placenta prævia fœtal death occurs at the moment of birth; when a normally implanted placenta prolapses it presents by the fœtal surface, placenta prævia presents by the maternal surface; the danger for the mother from septic infection is equally great; from hemorrhage, great in placenta prævia only; the prognosis for the child is equally grave in both cases.

Antero-posterior Compression Forceps.

Sloan (*British Medical Journal*, February 2, 1889) has devised a forceps for use in flat pelves, in which the head commonly presents transversely. The forceps is fifteen inches long, with a pelvic angle of thirty degrees. One blade is intended to grasp the head from directly behind the symphysis pubis, the other passes posteriorly, the promontory of the sacrum fitting into its fenestra: the fenestræ are large, the rims wide, and the shanks strong enough to admit considerable compression of the head.

The theory of the forceps consists in compressing the head, reducing the biparietal diameter, and dislodging the anterior parietal bone which ordinarily hinders descent by over-riding the symphysis pubis. The head passes the promontory without dangerous compression, and rotates into the antero-posterior diameter of the outlet. Sloan has had as yet limited opportunity to apply his forceps; the results in his cases indicated that the head may be delivered without excessive compression, and craniotomy avoided in some cases of flat pelvis.

Different Methods of Performing Craniotomy.

Donald (*Lancet*, January 12, 1889), in a paper before the London Obstetrical Society, believed craniotomy indicated when axis-traction with forceps failed; when the head could not be extricated after version; when the child was dead; when the mother's condition forbade Cæsarean section; in fœtal deformities. When axis-traction forceps fail to deliver the head, perforation may be done without removing the forceps, and the head compressed and extracted by the forceps. In highly contracted pelves podalic version, extraction of the body, perforation through the roof of the mouth, cephalotripsy of the head, and extraction by the cephalotribe or by traction on the lower jaw and body, with suprapubic pressure, may be performed. The advantages of this method were stated as firm fixation of the head and thorough crushing of the base; the head may be easily turned by the cephalotribe in any pelvic diameter; the head often collapses by traction on the body and jaw and suprapubic pressure on the head.

Galabin preferred the cephalotribe to other extractors after craniotomy; he had found craniotomy on the after-coming head a difficult procedure.

Herman rarely performed version but crushed the head with the cephalotribe and rotated it in the greatest pelvic diameter; when the neck and shoulders did not descend he rotated them by external pressure.

Routh performed decapitation close to the foramen magnum by heavy scissors bent at an obtuse angle; the handles were long, giving great power. The head was then steadied from above, and perforation or cephalotripsy performed.

Griffith had perforated the head, seized it with a powerful cranioclast, and rotated it slowly, causing it to collapse by pressure against the pelvic walls; as no spiculæ of bone presented, no damage was done to the mother.

Donald remarked that his percentage of craniotomies had been 1 in 700 labors; when the lower uterine segment was not greatly distended he performed version and perforation of the after-coming head.

Cæsarean Section for Carcinoma Uteri.

Beaucamst (*Centralblatt für Gynäkologie*, No. 52, 1888) reports a case of twin pregnancy complicated by carcinoma of the cervix uteri treated by laparotomy. An elastic ligature was placed about the cervix; the uterus was incised and emptied, one twin having died and partly macerated; the fundus was then amputated, and the cervix was inverted and stitched through the vaginal walls. The patient recovered, and was subsequently operated on for the removal of the carcinoma.

This method of treating the stump was devised by Frank, who first stitched the edges of the stump together with silver sutures, leaving them long; they were drawn through the vagina, emerging at the vulva, and the cervix was thus inverted, closing the abdominal peritoneum and bringing the stump external to it.

Triple Pregnancy; Sudden Death in Labor; Extraction of the Children.

Pinard (*Annales de Gynécologie*, January, 1889) reports a case of triple pregnancy in which a diagnosis of triplets was made before labor by abdominal palpation. Examination of the patient revealed no abnormality in the viscera. At labor the os dilated readily, and a head engaged: the patient was suddenly taken with severe dyspnœa, and died almost instantly. The midwife in attendance ruptured the membranes, and extracted the triplets in succession by grasping the feet; all were resuscitated and lived. The placentæ remained adherent.

Post-mortem examination revealed an enormously enlarged liver; the stomach greatly distended by gas; the cardiac ventricles thinned and distended, the walls fatty, and obliterative endarteritis in the vessels supplying the ventricular muscle. Death resulted from sudden dilatation of the ventricles and failure of the heart's action. A detailed report of the condition of the uterus will be published subsequently

Of practical interest in the case are the enormous size of the liver, which was engorged with blood, the microscope showing intense congestion, and the ease with which the midwife delivered the triplets after the mother's death. The latter suggests the recommendation of Rizzoli, that children can be delivered *per vaginam* in case of sudden death in labor, without Cæsarean section.

A Case of Quadruple Pregnancy.

Steffeck (*Centralblatt für Gynäkologie*, No. 51, 1888) reports a case of quadruple pregnancy, birth occurring spontaneously at term. The children did not survive their birth; they were a boy and three girls. The mother made a good recovery. The case was supposed to be twin pregnancy from the size of the abdomen; no further diagnosis was possible before labor. The children were perfectly formed, and as large as at six months.

There were two twin placentæ; the cords were marginal in their insertion. The membranes, with one placenta, were two amnions, a common chorion; the amnion divided the intra-membranous space into unequal halves. With the second placenta were two amnions and two chorions; decidua was not

present on the chorions, both ova had united before the reflexa was formed. The fœtal surface of the placenta was divided into unequal halves; there were no anastomoses between the bloodvessels of the two ova. The placentæ were attached together, an imperfect partition existing between them. Twin pregnancy had occurred twice in the families of the parents.

Extra-uterine Pregnancy.

Treub (*Zeitschrift für Geburtshülfe*, Band 15, Heft 2) reports two cases of extra-uterine pregnancy treated by laparotomy. The first was diagnosticated by the presence of an abdominal tumor, pain, slight fever, discharge of decidua, and an empty uterus: as pregnancy advanced the fœtus could be outlined in the abdominal cavity. A few weeks before term laparotomy was performed. The placenta lay in the line of incision, and was partially cut through and partially perforated by the hand; the child was extracted and the placenta removed. Adhesions were ligated, and the edges of the fœtal sac were stitched to the abdominal wall. The sac was tamponned with iodoform gauze. The patient rallied from the operation, and the sac lessened in size. Suppuration persisted in the sac wall, and the patient suffered from septicæmia. Other applications failing to arrest suppuration, the following powder was used freely in the cavity:

Sodii biborat.	50 parts.
Acid. salicyl. pur.	20 "
Iodoform	10 "

The patient gradually became afebrile, suppuration ceased and recovery ensued. The child also recovered.

A second case of tubal pregnancy, which became abdominal by the rupture of the tube, was allowed to go on undisturbed until the fœtus died, and by its maceration the mother contracted septicæmia. Laparotomy was performed, but too late; the patient died soon after. The second case was allowed to go on in the hope that the placental circulation would become obliterated, thus removing the danger of hemorrhage; the delay was fatal.

Extra-uterine Pregnancy, with Formation of a Lithopædion.

Breisky (*Wiener klinische Wochenschrift*, No. 38, 1888) reports a case of tubal pregnancy which became abdominal by the bursting of the tube. As no great shock resulted, the patient was instructed to return for operation when fœtal movements were no longer perceived. Eight years after the patient returned, the fœtus having become a lithopædion, which was causing pain and irritation of the surrounding viscera. It was removed with difficulty by laparotomy; to release the fœtus from its adhesions it was necessary to incise the abdominal walls laterally as well as in the median line. The mother recovered. Very little calcification had occurred; the organs of the fœtal body were intact, and the microscope demonstrated the various tissues.

Maternal and Fœtal Leucæmia.

Sänger (*Archiv für Gynäkologie*, Band 33, Heft 2) reports a case of leucæmia during pregnancy, characterized by splenic tumor, which became so

large as to necessitate the induction of labor; the maternal blood was very rich in leucocytes. But little blood was lost at labor; the child was living and healthy. The puerperal period was normal, the mother regained comfortable health, but the splenic tumor remained.

Sänger concludes from the study of his and similar cases that abortion should not be performed, but pregnancy allowed to go on until the child is viable, when labor should be induced. In leucæmia the placenta is expelled without severe hemorrhage; mothers and children recover. In pernicious anæmia the mothers rapidly fail and die after labor. Leucocytes do not pass from the maternal to the fœtal blood.

Sänger also reports an interesting case of leucæmia in a fœtus at term stillborn, with extensive dropsy and disseminated lymphomata. The mother suffered from nephritis, dying after labor. From the study of this case he concludes that leucocytes do not pass from maternal to fœtal blood, and that leucæmia is not communicated by either mother or child.

The Treatment of Puerperal Septicæmia by Constant Disinfection.

Kurz (*Wiener Klinik*, December, 1888) has obtained excellent results in treating puerperal septicæmia by constant irrigation with a warm solution of carbolic acid, from 1 to 3 per cent.; he commonly employs a 2 per cent. solution with alcohol.

The patient lies upon a convenient bedpan or douche pan, so arranged that fluid may be constantly discharged. An irrigator holding five gallons is placed about three feet above the patient's bed and filled with the solution, the fluid may be passed through Leiter's alcohol lamp to advantage, by which a constant temperature is maintained; a thermometer in the exit tube affords an accurate measurement of the heat of the solution.

Kurz has constructed an intrauterine catheter having but one curve, which he prefers; after a vaginal douche has been given this catheter is inserted in the uterus and the fluid allowed to flow. The douche is continued until the temperature becomes normal; the stream is shut off but the catheter is allowed to remain. When the temperature is subnormal or remains at normal and the pulse sinks the catheter is removed. A trace of carbolic acid in the urine is disregarded; when pronounced symptoms of carbolic intoxication are present the stream is shut off—this happens very rarely.

Eight cases of puerperal septicæmia are reported in detail, successfully treated by this method. Thirty deaths from douches of bichloride of mercury are recorded, and carbolic acid is preferred for intrauterine injections. Kurz ascribes much of the benefit in the use of this treatment to the absorption of the alcohol and carbolic acid.

The Modification of the Milk Curd in Infant Feeding.

Rotch (*Boston Medical and Surgical Journal*, Feb. 7, 1889) has experimented in making the curd of cow's milk lighter and more diffusible for infant feeding. He finds dilution with water, or lime-water, the best means of accomplishing this result. Substances added to separate the curd, as Mellin's food, cracker-crumbs or bread-crumbs, were much less efficient than dilution with water. Lime water is the best corrective for acidity.

Four Cases of Polymastia.

Auvard (*Archives de Tocologie*, No. 10, 1888) reports four cases of supernumerary mammæ, located in the axillæ, becoming enlarged and painful at menstruation and lactation, and accompanied by normal thoracic mammæ.

Infant Mortality caused by Syphilis.

Pileur (*Bulletins de la Société Obstétricale*, No. 11, 1888) has made extensive investigations regarding fœtal syphilis among the inmates of the reformatory and prison of Saint-Lazare, Paris. From his elaborate statistics, he concludes that of every 100 women of average condition in life who become pregnant, 14 become syphilitic. Of 100 children conceived by syphilitic mothers, 7 only survive the first months of existence. Of 100 children conceived in Paris, 13 perish from maternal syphilis, excluding all other causes of infant mortality.

Pileur estimates that 64,657 conceptions occur yearly in Paris, of which 9051 are by syphilitic mothers. Of these, 8418 perish *in utero* or soon after birth; 633 only survive. [Pileur's estimates of conceptions are obtained by collecting births, miscarriages, and abortions.—Ed.]

The Location of Spontaneous Rupture of the Umbilical Cord, a Medico-legal Point.

Trachet tabulates 18 cases of spontaneous rupture of the cord in unattended labors, concluding that the point of rupture is generally at an extremity, placental or umbilical; rupture in the middle of the cord rarely occurs spontaneously. As a medico-legal point, this will aid an inquiry to determine a question of possible fœticide.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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Epidemic of Pneumonia.

In June of 1888 Nantes was the scene of an epidemic of pneumonia occurring principally amongst the workers in a special factory. The details of the industry given by Dr. Ollive, of Nantes, will serve to show the kind of work on which those who suffered were employed. The manufacture is that of manure; the factory contains phosphates and clinkers from furnaces where dephosphorization of steel has taken place. These clinkers, which come principally from Middlesborough, are in the form of a grayish-black substance of considerable density and variable volume, and they have to be reduced to

dust. For this purpose they are thrown under cast-iron grindstones placed vertically, and thus, by the rotation of the wheels, the clinkers are crushed; the dust is then carried into bolters, and afterward put into bags. This dust is rich in phosphate of lime, of iron, and of manganese, and contains also iron and quicklime. In order to decrease its richness, it is mixed with inert materials. These operations cannot be accomplished without the air of the chambers being saturated with dust.

The factory contains a tub of water used for supplying the boiler and other purposes; this water is taken from the Loire, being pumped into pipes; samples were analyzed, showing that those taken at low tide contained ten times as much nitrites as those taken at high tides; both were ammoniacal, and swarmed with microörganisms. An examination of the factory was made, and it was found that the cold was intense, as, owing to its construction, it resembled a long passage, a current of air always passing through it; other factories in Nantes were inspected where the work and dust are the same, but no cases of pneumonia could be traced. Those who were attacked in this factory had been employed but a short time, varying from fifteen days to three months, the disease was of great severity, for of 13 who were attacked 11 died. In addition to these cases, there were in the hospital 14 persons suffering from pneumonia, who had not been employed in the factory, and they all recovered. The first factory case occurred on Mary 28th, the last June 26th; soon after the factory was closed, and from that date the cases in the town began to diminish. Information was also obtained from Middlesborough as to methods of conducting the operation of crushing the clinkers in that town, and it was stated that diseases of the respiratory organs were very common among those who worked in similar factories.

Simultaneously an epidemic of pneumonia occurred in Middlesborough, of which Dr. Ballard, of the Local Government Board, London, gave some account to Dr. Ollive. He stated that the clinkers are crushed to form manure, and the workpeople believe the dust to be the cause of the epidemic, but the disease was not limited to those who work in the factories, or to their neighbors, but extended to certain districts two to four miles distant from Middlesborough, women and children not escaping, though the principal sufferers were men. The medical men of the neighborhood consider the disease to be an infectious fever. Dr. Ballard stated that his inquiry was still proceeding.—*Revue d'Hygiène*, tome x., No. 9, September 20, 1888.

Lead Poisoning in Potters.

In a Russian paper published early in 1888, Dr. Rüsskïkh relates his experiences with regard to cases of lead poisoning among potters in and near Ekaterinburg, an Ural industrial town. He states that during the last eleven months he found it necessary to send four potters to the hospital, one of whom was suffering from paresis of his hands and colic, another from arthralgia and colic, and the other two from severe colic alone; milder cases, such as slight saturnine cachexia, he treated in their own homes. A boy, whose business consisted in agitating molten lead, was found to have a blue line along the gums after only one month's work, and visitors to the potteries cannot fail to be struck with the paleness, puffy faces, and apathetic, slow

movements of the workers. Dr. Rüsskīkh recommends various precautionary measures to aid in preventing injury to the potters: That quartz should be mixed with metallic lead and also minium before being melted, that the melting oven should be provided with a hood to prevent the escape of lead dust, and that the chimney should be constructed in a hermetically sealed fashion; that grinding and agitating lead should be done by horses, as in many potteries, that children under sixteen years should not be employed, and that workpeople should be prohibited from eating, drinking, or sleeping in the workshops. And he further recommends the erection of spacious, well-lighted, ventilated, and heated workshops supplied with plenty of good water and clean lavatory accommodation.—*Sanitary Record*, vol. x. part 112, October, 1888.

Disinfection by Steam.

Experiments with Prof. van Overbeet de Meyer's apparatus were made during October at Bermondsey, London. The apparatus consists of a square box of any size desirable, with an outer or water jacket, a furnace underneath, an inlet for steam at the bottom, and an outlet for it at the top. Amongst other things, some cholera germs in a test tube, and two sets of bacillus anthrax in thread-like form, one set in sealed test tubes not disinfected, were placed in the centre of a blanket, in which was also a thermometer and an electrical apparatus containing a soft metal, which melted at 100° C., and was connected with a bell outside. In six and a half minutes after closing the apparatus steam began to escape, and in ten minutes the bell rang, showing 100° C. had been reached. The time allowed for disinfection was forty minutes, and the articles were taken out. There was a pillow, a thick overcoat, and some colored ribbon; the steam had penetrated everyting, but even the color of the ribbon was uninjured, and the things only required to be dried by exposure to the air. The test tubes were then placed in an incubator; two contained anthrax and cholera which had been disinfected, and two, for the purpose of control, which had not passed through any operation. The following were the results: at 30° C. the control anthrax tube developed slight cloudiness in 24 hours, and was typically an anthrax culture in 27 hours, and the control cholera tube became cloudy at 37° C., but the tubes containing anthrax and cholera germs, which had passed through the oven, showed no signs of growth, though exposed to 37° C. for 78 hours.—*Sanitary Record*, vol. x. part 112, October, 1888.

Arsenic.

Mr. Stokes, public analyst for the Paddington district of London, has lately drawn attention to the amount of arsenic contained in household things. He states that he examined a number of imitation Indian muslins and cretonnes, and twenty-three per cent. he found to contain arsenic in appreciable quantities, the highest proportion being two and one-tenth grains per square yard; the colors in which the arsenic was chiefly found were terra-cotta reds and greenish-browns. In two cases medical men had brought the samples, cases of arsenical poisoning having occurred; in one case, six or eight work-

girls, employed in making up the material, were taken ill. Mr. Stokes also examined a green mat in use in his own house, and a cardboard box for bonbons. The mat, which weighed 9 ounces, contained 21 grains of white arsenic; the box, which measured 5 x 1¾ inches, contained one-tenth of a grain of white arsenic. Ten per cent. of wall-papers analyzed contained arsenic, and, of late years, it has been found in playing cards, the glaze of enamel stew pans, and in some furs, those prepared by amateurs. Mr. Stokes recommends that the use of arsenic for producing colors should be prohibited by law.—*Sanitary Record*, vol. x. part 113, November, 1888.

Typhus Fever in Eastern Germany, and Necessary Precautions.

In the third number of the *Vierteljahresschrift für öffentliche Gesundheitspflege* for 1888, appears an article on typhus fever considered from a hygienic and sanitary police point of view, by Dr. Simon, of Breslau, a part of Germany which suffers more than almost any other from typhus. He points out the difficulties which until recently prevented the diagnosis of the disease, but said that the enormous contagiousness of typhus has aided the sanitary authority in early recognizing an outbreak; typical cases, he found, occurred mostly when the epidemic is at its height. The disease is spread by tramps and vagabonds, and finds a suitable soil for propagation wherever the ground has been rendered damp and unhealthy from floods, or in the overcrowding of small, damp, badly ventilated dwellings, where dirt and poverty are to be found. The special localities in Germany where typhus is almost endemic, are those provinces nearest to Russia, such as East and West Prussia, Posen, and Pomerania, and it increases in intensity in proportion as it nears the Russian frontier. Dr. Simon also gives an account of epidemics which occurred in 1868 and 1876 to 1878, in East and West Prussia, and in Breslau, showing that in the latter city the one quarter in which the disease was most severe, was that which contained marsh land and stagnant pools of water; he also states that, after a thorough drainage and canalization scheme was carried out, the fever no longer appeared.

He then proceeds to consider the precautions to be taken to prevent epidemics of typhus in districts where for years the disease has been endemic, and states that they can be most efficiently carried out by the coöperation of the State, the communes, and private individuals, by raising the standard of culture and cleanliness amongst the people, and by an improvement in trade, and consequently in the circumstances of the poor. The local authorities can aid by carrying out drainage schemes, by enforcing cleanliness in houses, by preventing over-crowding, and by providing suitable accommodation for all classes. There should be a larger number of hospitals in the districts than at present exist; where, if possible, there should be thirty beds available for every 10,000 inhabitants. The local authority can also make suitable arrangements for disinfection, and also for ambulances which would be available in case of need. Strict watchfulness should be exercised over small inns and places where tramps are likely to assemble, and on all occasions of pilgrimages, emigration, fairs, and other times of collection of crowds, great care should be taken to enforce sanitary measures. These precautions must be taken before the outbreak commences, but as soon as the first case occurs, notifica-

tion of all doubtful cases should be insisted on; all houses should be visited in search of sick persons, and when found they should be isolated, if possible in hospitals, if not, in their own homes, where daily disinfection should be enforced according to the Berlin regulations of 1887 for disinfection. In country districts, where it is difficult to obtain nurses or persons who understand disinfection, special provision would have to be made by the local authority; they could probably obtain the necessary staff to carry out the instructions from the nearest town.

During times of epidemic prevalence of typhus, all infected inns, all schools and insanitary dwellings should be closed, and it would be well to postpone the meeting of large numbers of persons for manœuvres, public vaccination, or other purposes. The arrangements for disposal of the dead must necessarily be carefully attended to; bodies should not be washed, but laid in cloths soaked in a solution of carbolic acid, and buried as soon as possible. Dr. Simon also considers the public mind should be kept as tranquil as possible by means of constant reports in the papers as to the state of health of the district.

Inspection of Meat.

It was decided in 1883 in Berlin by the town authorities, that all fresh meat not slaughtered in the public abattoir should be subjected to an inspection by competent officers before being permitted to be sold, but, owing to a variety of reasons, it was not until April, 1887, that this could be carried into effect. In the *Vierteljahresschrift für öffentliche Gesundheitsplege*, Bd. 20, Heft 4, 1888, Dr. Herlivig, superintendent of the meat inspectors, gives an account of the work which has since been accomplished. The most difficult task was to find suitable places for the inspection stations, and also trustworthy assistants in this work of the authority; what was suitable for Cologne, Bremen, Hanover, and Munich, did not seem so for Berlin, and even the most careful inquiries proved at first unsatisfactory. Amongst many the feeling was that this inspection was unnecessary, and that if carried out it would endanger the fresh meat trade in the market, that the butchers' stalls in the new market would be empty, and that, on account of want of competition, the price of meat would be very much raised. Besides, it was urged that of the few butchers who might continue their trade, none would bring diseased meat to the station.

However, in spite of all opposition, the work of inspection was commenced, and has proved most successful. At first there were eight inspection stations, all close to the main thoroughfares or railway stations where meat would arrive, or near the market places, and one was erected in the central abattoir itself, so as to be accessible for the eastern portion of Berlin, but this last station was soon given up, as the butchers from the suburbs preferred to buy either meat which had been killed, or to kill it at the public abattoir. One station, that in the central market place, is always open, but the hours for the others vary according to the work, some being required from 3 A. M. to 10 A. M., others from 12 to 7 A. M., and some from 7 P. M. to 7 A. M., when there is much work to be done. No inconsiderable amount of trouble was taken to obtain the necessary staff, which consisted of 116 persons, and these on Tues-

days and Fridays had to be supplemented by 40 to 50 meat inspectors and various veterinary surgeons. The amount of work to be done at times at one station may be shown by the number of animals inspected on one special day: 371 quarters of beef, 403 calves, 147 sheep, and 515 pigs. The veterinary surgeons and meat inspectors were appointed six months before the opening of the stations, so that that they might become familiar with the inspections at the abattoir, and thus commence their work of examination without any delay.

The stations consist of an office, two adjoining rooms, one for microscopical and one for macroscopical investigations, and an observation room for the meat; the chief of the station is a veterinary surgeon, and one of the meat inspectors, who has control over the other inspectors, takes his place when absent. As soon as the meat arrives in front of the station, the officials commence their work; the unloading of the meat by the butchers has to be watched, to see that they come in turn and that more meat is not brought in than can be inspected at one time. The butcher then pays for the inspection, and his list having been compared with the meat brought in, the inspector commences his inspection of the meat in conformity with the regulations in force. According to the condition in which the meat is found to be, it is stamped by one of the officials, and either taken away at once by the butcher, and kept for further examination, or the police are communicated with and the meat detained. Every butcher obtains a printed form stating the kind of meat examined for him at the station. All lymphatic glands are especially examined for signs of tuberculosis or pneumonia, and in cases of doubt the meat is detained until it can be proved to be satisfactory.

All meat brought for inspection must be taken from animals which, before being slaughtered, have undergone examination and been certified as not suffering from disease, and this certificate is kept at the inspection station. These certificates are not always given by veterinary surgeons, but if the animals are examined by trustworthy persons accustomed to signs of health and disease in animals, that is all that is necessary.

The greatest watchfulness is needed to prevent meat being sold as inspected meat until after examination, and to insure that all fresh meat does really come to the station as soon as it arrives in Berlin; in these matters the police and railway officials are of great service. At times evasion of the regulations takes place, but it is almost impossible to prevent it in a large commercial city; but very much has been done to insure that all the *chief* butchers' stalls and shops shall only contain inspected meat, and it is hoped later to control all meat which is prepared in hotels and eating houses, and even still further, to inspect all materials used for such food as sausages, preserved meats, and ham. Until this regulation is enforced, meat which is diseased and that which is not inspected will be used for such purposes without it being possible to prevent it.

Last winter, it happened that a butcher from the suburbs brought a quantity of meat to one of the inspection stations, and while this was being examined, one of the officials informed the presiding veterinary surgeon that on the cart outside was a whole pig which had been slaughtered. The butcher then stated that this was for a restaurant, and did not come under the law of inspection, but the veterinary surgeon ordered a mark to be placed on the pig

and the cart to be followed, so as to ascertain the truth of the butcher's statement; instead, however, of taking it to a restaurant, he took it to his own stall in the market, where the officials from the station took possession of it, and when examined it was found to be extensively diseased. There was no doubt the butcher knew its condition, and thought to escape inspection by making such a statement. Very many similar cases were discovered and punishment inflicted, but it is certain many others escaped detection, since, if meat is found at a butcher's which has not been examined, he can state it is to be manufactured into sausages, and nothing more can be done, even though it is probable the meat is afterward sold as fresh meat.

The fresh meat trade, however, which was thought to be endangered by this system of inspection has, during the past year, increased rather than diminished, and the price of meat has not risen; indeed, the cost of dead meat is less than the original cost of living animals at the market. The meat inspection in the provinces has also been more carefully performed since irregularities were discovered as the result of inspection of meat brought to Berlin, and thus a marked improvement has taken place in the meat trade with the provinces. The total number of animals examined during the year was 91,610 sheep, 99,691 pigs, 143,955 calves, and 103,359 quarters of beef. Of the meat rejected and handed over to the police as unfit for food very much contained tubercle; trichinæ and measles were present in the pork eighteen and seventy-eight times, respectively, while in more than 1000 calves the meat was too watery to be fit for food; in some, echinococci were found; in others, thread-worms; and a great deal of meat was detained on account of its having become decomposed. In thirty cases the officials belonging to the inspection stations detected meat exposed for sale that had not been inspected, or that had already been confiscated by the police.

"Ticketed Houses" of Glasgow, Scotland.

At a meeting of the Glasgow Philosophical Society, in November, 1888, Dr. Russell, the Medical Officer of Health for Glasgow, read a paper on the "ticketed houses" of Glasgow, with a view to showing the condition of the occupants, and in what way an amelioration of their lives might be effected. He introduced his subject by showing how the death-rate in towns rises with the diminution of the size of the house, with especial reference to the mortality statistics of Glasgow after an investigation made in 1885. He illustrated by a diagram and by tables that 70.8 per cent. of the population lived in one and two-roomed houses, and contributed 79.4 per cent. of the deaths, while the remaining 29.2 per cent, living in houses of three or more rooms, contributed only 20.6 per cent. of the deaths.

As to the classes of disease in which these deaths occurred, taking the death-rates in the large houses as *unity*, the death-rate from zymotic diseases was 2 in medium-sized houses, and 4 in small houses; from diseases of the lungs it was 2 in the medium sized houses, and 3 in the small houses; and from diseases of nutrition special to children it was 2½ in medium-sized houses, and fully 5 in the small houses. The death-rates in the different districts ranged from 16 to 42, and since 70 per cent. of the population live in one or two-roomed houses, it is amongst these that the solution of the problem

must be sought, and yet even in districts composed of the same houses the death-rates differ as widely as 23 and 42. At that point in his address Dr. Russell explained the meaning of the words "ticketed houses."

In Glasgow the Police Act enables the occupation of a house of three rooms or less to be regulated, and a tin plate is affixed to the outer door, stating the cubic contents and the proportion of inmates allowed, giving 300 cubic feet per adult or two children under eight years. There are in Glasgow 23,288 ticketed houses, and about 35 per cent. of the one-room population and 14 per cent. of the two-room population live in these houses. These ticketed houses have nearly all been parts of larger houses divided by partitions, or even parts of single rooms in larger houses; and, as a consequence, the light and ventilation are defective, the stairways crowded, and the sanitary arrangements inadequate. As compared with model buildings, the cubic air spaces of the ticketed houses are very much less—about one-half, and the houses are mostly overcrowded when inspected during the night. The rent paid for the accommodation obtained in these ticketed houses is also very much higher than in the model dwellings; but then the class of people who inhabit the former would not be admitted into the latter houses, they must reform before they can live in wholesome houses, and until then they continue to pay dearly for a house without any of the conveniences or comforts of life.

The only step to be taken by the authorities, according to Dr. Russell, is to improve the existing dwellings, and to see that the small houses which are being built, are up to a reasonable standard of wholesomeness; then, also, in Glasgow is wanted the power of dealing with unhealthy dwellings, such as is possessed by the Edinburgh authorities in their Police Act (1879), by which the medical officer of health and borough engineer can certify to the magistrates and council that a house is unfit for habitation, and they may order that after a certain date it shall no longer be inhabited, a penalty being inflicted if the order be not complied with. In addition to all that officials and authorities can do, there is still much work for the private individual; Artisans' Dwellings Companies might be started to build tenements and help to elevate the 75,000 inhabitants of the ticketed houses, and Open Spaces Associations would do much to lower the death-rates. Or private individuals might acquire tenement houses and introduce into the relation of landlord and tenant a feeling of friendly interest and moral responsibility; or they might undertake the agency of properties held by private individuals, and insist on the maintenance of the property being the first charge on the rental, and these are probably the best directions which private enterprise can take.

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